

AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y., U.S.A.

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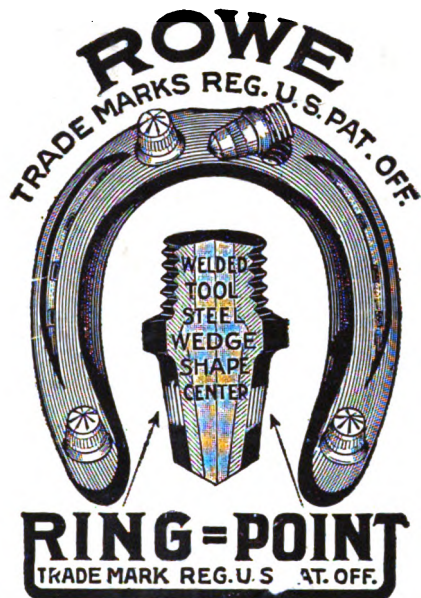
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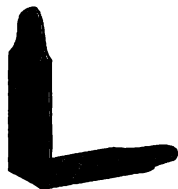
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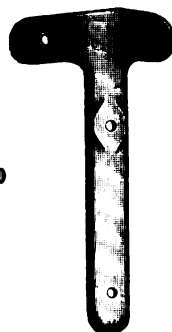


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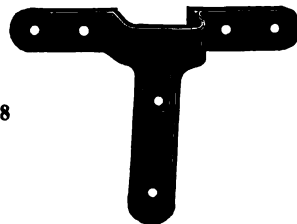
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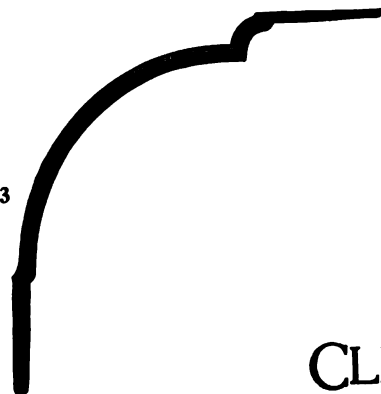
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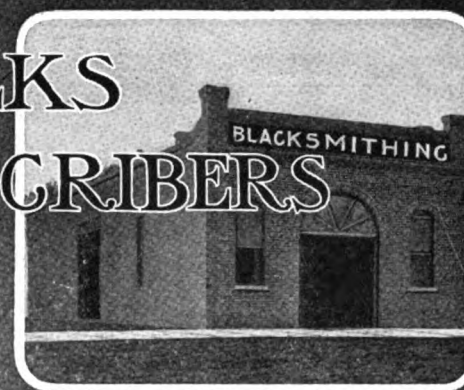


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Another Volume Begins.

This issue starts the fifteenth year of THE AMERICAN BLACKSMITH. What will this next year bring forth? Great changes have taken place in the craft during the past fourteen years—since THE AMERICAN BLACKSMITH was started. And changes are taking place now. What will these mean to the craft during the next year? It is more important than ever that the members of the good old craft keep a constant finger on the pulse of the times. If changes are going on in the trade you want to know it. And the only way you can safeguard yourself from elimination in the great contest of business and trade is to keep constantly in touch with the things that are going on.

This next year, you will find reflected in the columns of "Our Journal", the changes and reforms that are going on in the craft. Do you find things different in your business and shop? There is a reason and if you'll look to THE AMERICAN BLACKSMITH you'll find an answer to the puzzling problems of business evolution.

This coming year promises to be a year of revelations and to prevent your being caught napping you'll need to read THE AMERICAN BLACKSMITH.

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A Query Service.

Our query service which has always been a big feature of AMERICAN BLACKSMITH Subscribers' Service will be more valuable than ever this coming year. The addition of several new members to our question staff will make our query service the best it is possible to make it. Just read the following names and see just what kind of men are ready to give you advice and help if you are a reader of THE AMERICAN BLACKSMITH:

Elton J. Buckley—Attorney at law, writer on legal questions, legal adviser.

Dr. Jack Seiter—Expert horseshoer and veterinarian, writer on shoeing problems, adviser on matter pertaining to shoeing.

Franz Wenke—Government shoer, a practical man with practical ideas, will reply to questions on practical horseshoeing.

James Cran—"The forger of roses", an all around practical smith who knows blacksmithing and forge work from A to Z.

Bert Hillyer—A foreman smith who preaches and practices head work before hand work. He is a staunch advocate of "Safety First" in the smith shop.

M. C. Hillick—"The paint man", ask him anything about paint or painting for anything from a baby cart to a passenger train and he'll tell you all about it.

Homer N. Pope—An old yet ever new friend and adviser of "Our Folks".

Dayton O. Shaw—Another of "Our Journal's" veterans who is never more satisfied than when telling the youngsters how to do it right.

C. P. Shattuck—Our auto expert. He knows 'em from Ford to Pierce and can tell about anything you want to know.

M. K. Dunham—Oxy-Acetylene engineer. He knows the dual flame and apparatus from "stem to stern". Ask him to unravel your oxy-acetylene problems for you.

"The Bison"—Writer of "Bison Notes" knows more about the performers on the turf than the average woman knows about the fashions. If you want to know anything about any turf horse ask "The Bison".

L. R. Swartz has been studying well-drilling for so long that he doesn't feel "well" unless he's fussing around the top end of a hole into God's good green earth.

Isn't this a staff of which to be proud? To it will be added such men as may be necessary to care for the want and needs and requirements of "Our Folks" from time to time.

Two Examples of Artistic Smithing—Cambridge University, England

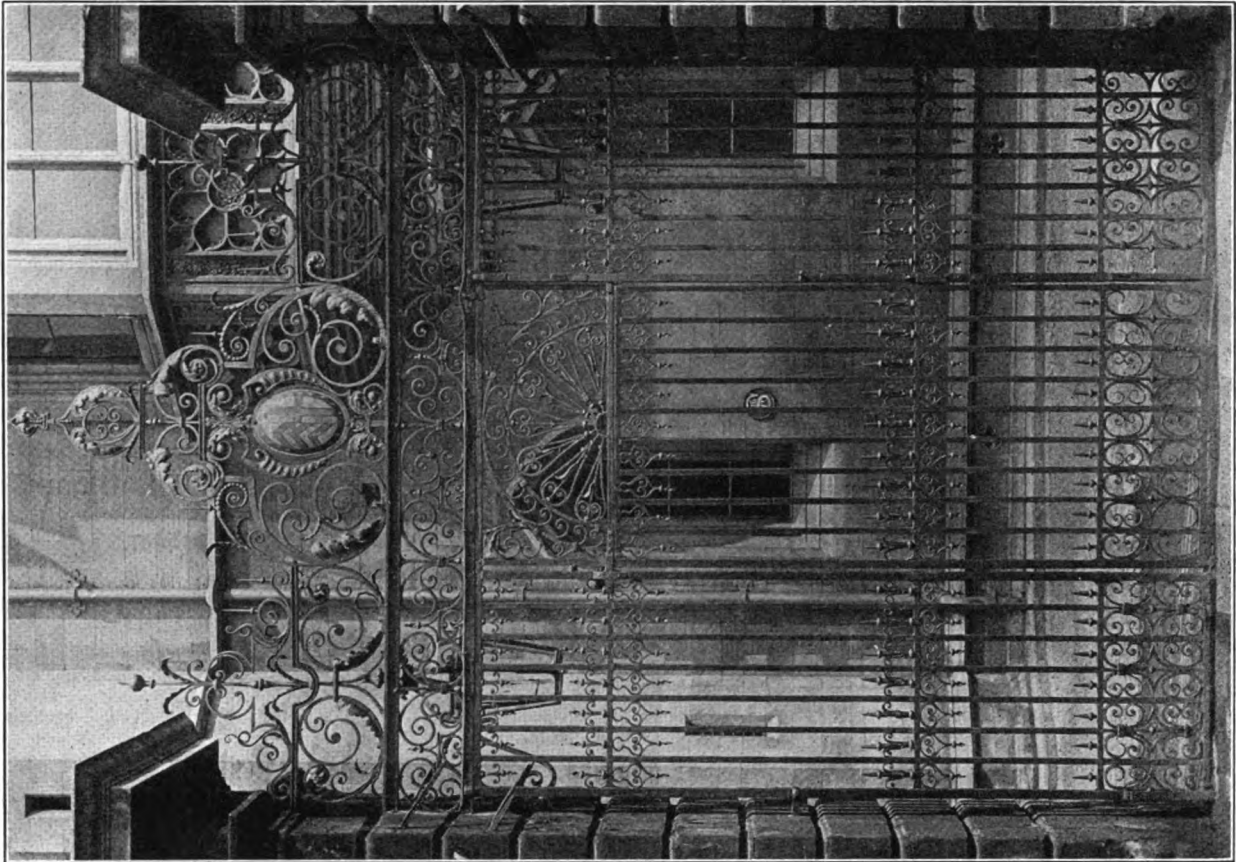


FIG. 5.—THE FRONT GATE AT CLARE COLLEGE

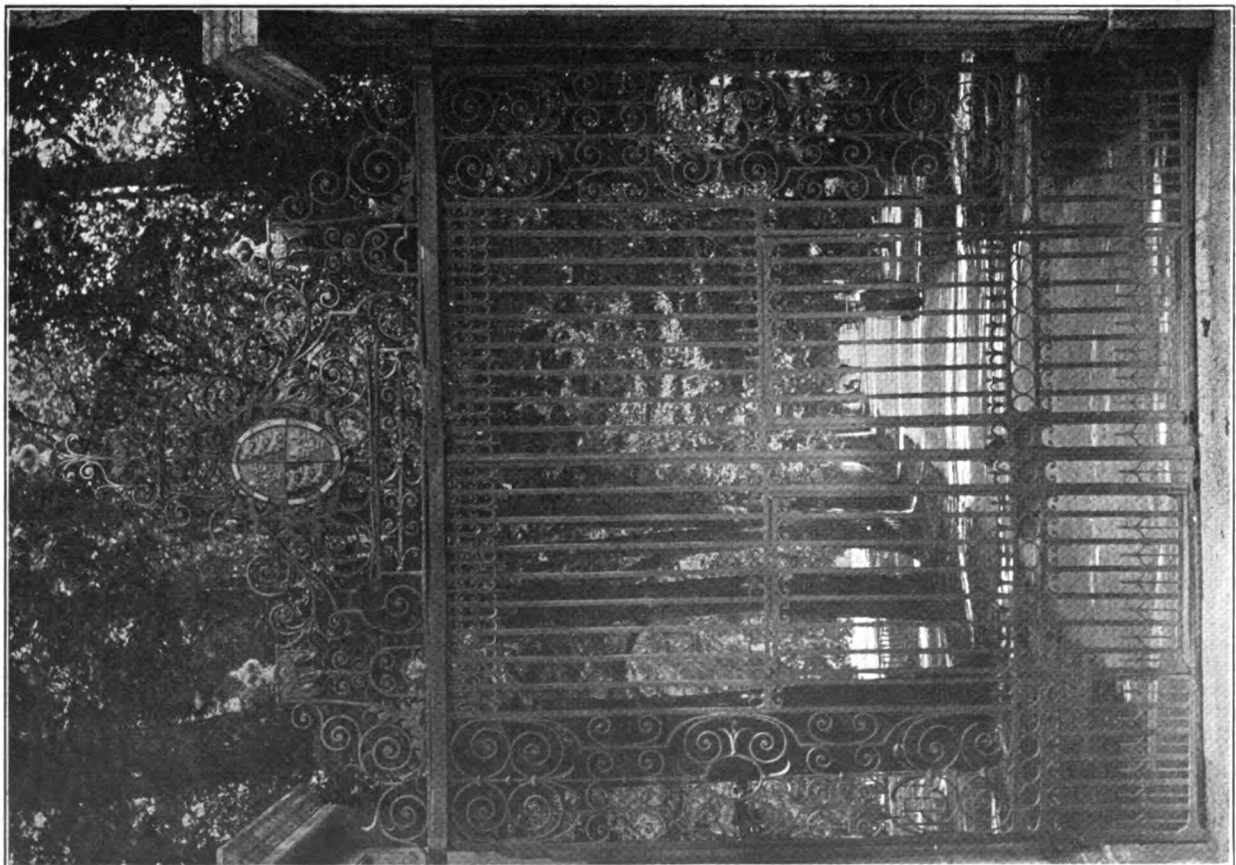


FIG. 1.—THE BRIDGE GATE AT ST. JOHN'S COLLEGE





gate which, as will be seen, is plain, closely spaced, vertical bars in the middle part with vertical scroll panels at each side.

In the old bridge gate, Fig. 2, we have a double leaf-gate with a fixed portion next the stone piers. This is an unusual method of framing an en-

A seven-foot gateway has been set off and at each side a fixed scroll panel extends from the ground to above the lintel of the gate. These panels are held firmly in position by two shaped stays which are battened into anchor stones. On each side of this a wrought iron railing extends.

complicated details of the ornament it becomes clear that if they are the work of the one craftsman the back gate, Fig. 4, was produced first. This is a decidedly beautiful gate on simple lines but it lacks variety in the spacing of the horizontal bars.

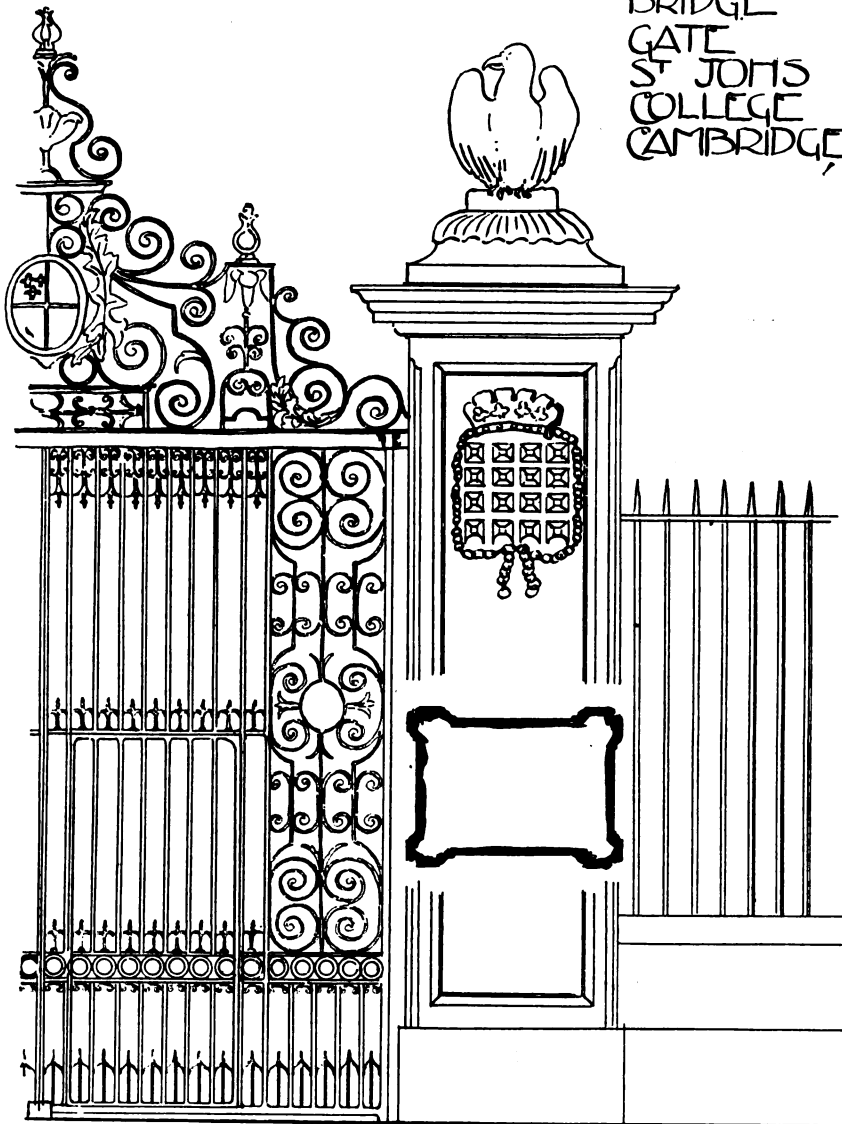
In the front gate, Fig. 5, we find more difference in the spacing of the main rails of the gate, while over the entrance gate the panel is set off on the ground lines of a circle with spherical spandrils and radiating ornamental scrolls. Immediately above this is a scroll-work frieze, and erected on the top is a fine example of antique work. The design and execution is a decided improvement on the gate in Fig. 4.

In the bridge gate, Fig. 6, we have a design of a three-opening gateway in which the design is exceedingly handsome.

In studying the complicated details of these elaborate specimens of ornamental work it is clear that they must have been made from carefully prepared drawings. There can be no doubt about that point, for we find in all these examples that the sizes of the different parts of the main frame and stems of the ornament are so beautifully proportioned and are so evenly graded that such delicate lines could only be obtained after careful thought and ripe experience. Where there is repeat ornament, each piece seems to be modeled so correctly as it appears as if it had been cast. This is certainly very remarkable, but when we consider that the smiths of the middle age had very often to turn their skill, not only to this repeat work, but to the manufacture of articles of domestic and social utility, it is no wonder that we find such a change from it to the present day work.

All of the gates shown are very artistic, some, of course, in a greater measure than others. They each carry out separate designs and details that are individual in many instances, and each may well be studied by the modern iron-smith, not only for ideas for similar work but as examples of skill, artistic ability and execution in the smiths who had to do with the making of these gates.

Through the romance of iron, we find the modern day inseparably linked with the days of centuries and ages ago. From the days of Glaucos of Chios, who is held to be the inventor of welding, to now, is a long cry, but the modern smith is using methods that have come across the ages with few alterations. The basic methods have stood the test of time.



DETAIL OF GATE AND RAIL PICTURED IN FIG. 1 OF THE FRONTISPIECE

trance and gives one the impression that the gate pillars had been erected too far apart or that the gate was made too small. Each half of the gate is hinged to the lintel bar and socket plate, while the meeting styles locked in the usual way. Overhead there is a well balanced scrolled pediment, and, strange to say, this ornamental panel only extends from the hinged to hinged style of the gate, the fixed portions being ornamented with independent scroll ornaments which tower upon each side.

In the construction of the back gate, Fig. 3, no stone pillar is used.

The design of the gate is in three parts; a fixed portion at each side, two feet wide, and a single leaf gate working in the middle. This gate is hinged in the usual way and has a lock on the striking edge. As in the other designs the horizontal members of the gates and railing are relieved by various patterns of repeat ornament which contain such lines and proportion as renders it fit for the space surrounding it.

There is no record of who made each of the Clare College gates shown in Figs. 4, 5 and 6, still there is evidence of a close relation between the designs. In comparing the



A New Fuel Gas for Welding and Cutting

J. F. SPRINGER.

The gases used in welding and cutting are two. There is the oxygen and then there must be a fuel gas. Ordinarily, the fuel gas is acetylene or hydrogen, and it would naturally be very desirable to have a satisfactory substitute for them if the substitute would cost distinctly less.

In the oil and natural gas regions, there are many different varieties of natural gas. Some of these, particularly those coming from the ordinary gas wells, have not as yet been found suitable. But certain others, waste products of oil wells, promise to help us out. The ordinary natural gas, such as that used at Pittsburgh, contain a large percentage of a gas known as *methane*. In fact, some of the ordinary natural gases contain but little else. Now methane does not contain enough British thermal units* per cubic foot to make it a successful competitor with acetylene. This is one of the main reasons why the Pittsburgh natural gas is unsuitable—it contains too much methane. Another reason consists in the fact that methane is very difficult to compress into the liquid or semi-liquid state. It requires, at ordinary temperatures, between 2,000 and 3,000 pounds per square inch to effect liquefaction. If this gas were shipped in the liquid form on the railroad in a steel container, the latter would have to be so enormously strong in order to provide for safety that the containers would probably be very expensive or transportation on the road and use in the shop would be dangerous. For the present, methane is out of the game.

But at Follansbee, W. Va., Sistersville, W. Va., Kane, Pa.—and perhaps many other localities—a gas is produced which contains only a moderate percentage of methane and a considerable percentage of certain other gases. Here it will be well to say a few words about natural gas in general and thus make matters more intelligible. Natural gas pretty much everywhere seems to consist of combinations of hydrogen and carbon. It is, in short, a mixture of *hydrocarbons*. Methane is one variety of hydrocarbon—there are many others in natural gases. They are called such names as ethane, propane, butane, pentane, hexane, etc. It will not be necessary to remember the

names. These other hydrocarbons have some very useful qualities, however, that will interest us. They are much more easily compressed than methane. This is a big thing. Then they are heavy heat producers. Ethane is the poorest of the lot in this respect, and yet it contains 75 per cent. more heat units per cubic foot than does methane. Propane con-

There is more than one way in which we may get the methane out and the gas to contain the hydrocarbons desired. In one, pressure is applied until it has risen to a point between 600 and 700 pounds, if the temperature is 95 degrees, Fahrenheit; or to a pressure equivalent when the temperature is taken into consideration. This may need



FIG. 3.—THE BACK GATE OF ST. JOHN'S COLLEGE AT CAMBRIDGE

tains two and one-half times as much heat capability as methane can be made to produce. It is not difficult to see then that a mixture of these other gases with little or no methane in it will give us a gas with a high heat value. Acetylene contains 1555 B. t. u. per cubic foot; but ethane contains nearly 20 per cent. more. The other hydrocarbons in these gases contain more yet. At the worst, the new gas—formed by excluding methane, if there were any originally—will be one-fifth better than acetylene from a heat point of view. In some cases, the heat value will probably be 80 per cent. more than that of acetylene.

a little explanation. The cooler a gas is, the less pressure will be needed for its liquefaction. In fact, if you make the temperature low enough, liquefaction will take place without pressure. What we aim to do is to liquefy ethane. When we have done that, the methane will still be a gas, but all the others will be in a liquid or semi-liquid state, using a pressure and a temperature that are convenient. The methane, being still a gas, we may let pass off into the air and be wasted, or we may use it in various ways at the place where the oil well is located and where compression takes place. The semi-liquid, left behind by the

*A British thermal unit (B. t. u.) is the amount of heat necessary in order to raise 1 pound of water, 1 degree, Fahrenheit.



methane or drawn off from it, is the new competitor of acetylene and hydrogen.

This new gas is, as has perhaps been sufficiently indicated already, a mixture of various hydrocarbon gases. It is sometimes called gasol. The new product compresses very compactly. One pound of it occupies the space of a cube, $3\frac{5}{8}$ inches on a side. This pound of semi-liquid material will produce 10

contain only a small fraction of this weight in acetylene; while a 200-pound tank of gasol would be half gas. If we also take into account that the gasol is from 20 to 80 per cent. better from a heat point of view, we are prepared to understand that shipping and handling this new gas is comparatively a much simpler matter.

This is an important thing to the smith. He pays less freight, and he

not at all unusual for high grade tanks to be capable of resisting. Of course, it is best to use tanks much stronger than the requirements seem to demand. The temperature of 131 degrees is pretty warm, much warmer than is experienced *in the shade* on the warmest summer days in most localities in the United States. But it is perhaps not such an excessive *sun* temperature. The tanks used should, accordingly, be pre-



DETAILS OF THE CLARE COLLEGE GATES PICTURED IN FIG. 5 (FRONTISPIECE) AND FIG. 6

cubic feet of gas equivalent to 12 or more cubic feet of acetylene.

It is much more convenient than acetylene, from the point of view of portability. With a proper quality of steel shell container, we may put into the container as much gas by weight as the container itself weighs. Indeed, it is expected to surpass this. Now nothing like this can be done with acetylene, for the reason that a mass of other material has to be put into the container in order to provide against explosions. In short, a tank of acetylene, the whole weighing 200 pounds, would

has to handle less weight in the smithy.

Another matter of importance upon which our attention may well be directed is the question as to how much pressure may be expected to be exerted against the walls of the container as the temperature changes from time to time. The United States Government has investigated this matter in connection with a gasol manufactured by its experts at Follansbee. At 131 degrees, Fahrenheit, there would be a bursting pressure of 755 pounds per square inch. This is a pressure which it is

viously tested satisfactorily to a pressure of at least 1,500 pounds. Even then, the smith should not put the tank where it is liable to receive heat from his fire or his work. It is important to bear in mind that we are scarcely dealing with a liquid. We should regard gasol as a gas while we are handling it and exposing it to heat and the like.

In order to use this product, we may simply draw from the container in which it is shipped. It seems better, however, to use a separate tank for movement about the shop. When this method is employed, we



would put the container which we get from the railroad station in a suitable place where there is no exposure to great changes of temperature. We take the shop tank up to it and connect the two. We may then fill the shop tank in such way as to permit the pressure in it to rise only to a very moderate degree. If the two tanks are of the same size, which they may very well be, we

It should be noted in this connection that while we must supply more oxygen per cubic foot of the fuel gas, we get more British thermal units. Naturally, the passageways in the burner must be proportioned differently in order to provide for the greater relative amount of oxygen. So, it will not do simply to get some of the gas any try it with a torch designed for acetylene or hydrogen.

order to maintain the flame in proper condition.

As to cutting, the new gas is a great success. Apparently it is better and faster than acetylene. The cut is smoother. As to welding, the experts have scarcely completed their work. The problem is to control the high heating capacity.

This same gas may be used for various purposes besides welding and cutting. Thus, it may be employed for heating ovens and the like. It may also be employed for lighting purposes. When used thus, a short inverted Welsbach mantle will prove highly suitable. Further, one may, if he desires, use the gas to operate an ordinary gas engine. Thus, the Government investigation covered the simple testing of the gas for this use. The high-pressure container was connected to a small cylindrical receiver, a reducing valve being employed to diminish the pressure. The receiver had a capacity of about 3 cubic feet. The gas vaporizing into it was kept at a pressure represented by about 3 inches of mercury. The receiver was direct-connected with the engine. The economy of this test was not determined. What was determined was simply that the gas was quite suitable for this service. Similarly, a tank of the liquefied product was successfully used in driving a 30-horse-power automobile.

Inefficiencies in the Mine Blacksmith Shop

LETSON BALLIET, in *Mining World*

Perhaps you know of a mine where the blacksmith shop is from 50 to 100 feet away from the shaft; possibly 500 to 1,000 pieces of dull drill steel are brought out of the mine daily and dumped at the collar of the mine; so that somebody's time and motions are required to gather them up and carry them into the shop to be sharpened. When they are sharpened, they must all be carried back and loaded into the skip or upon the cage. This is man power to handle a couple of tons of steel several times daily. At most mines we find a convenient drill rack. Upon this rack the drills are sorted with the various lengths and bit gauge all together. This means sorting and handling the steel again—by man motion. This aids the blacksmith, for all of the same gauge are sharpened before a change of dies and dollies are needed and but little, if any, change needed in the position of the butting block.

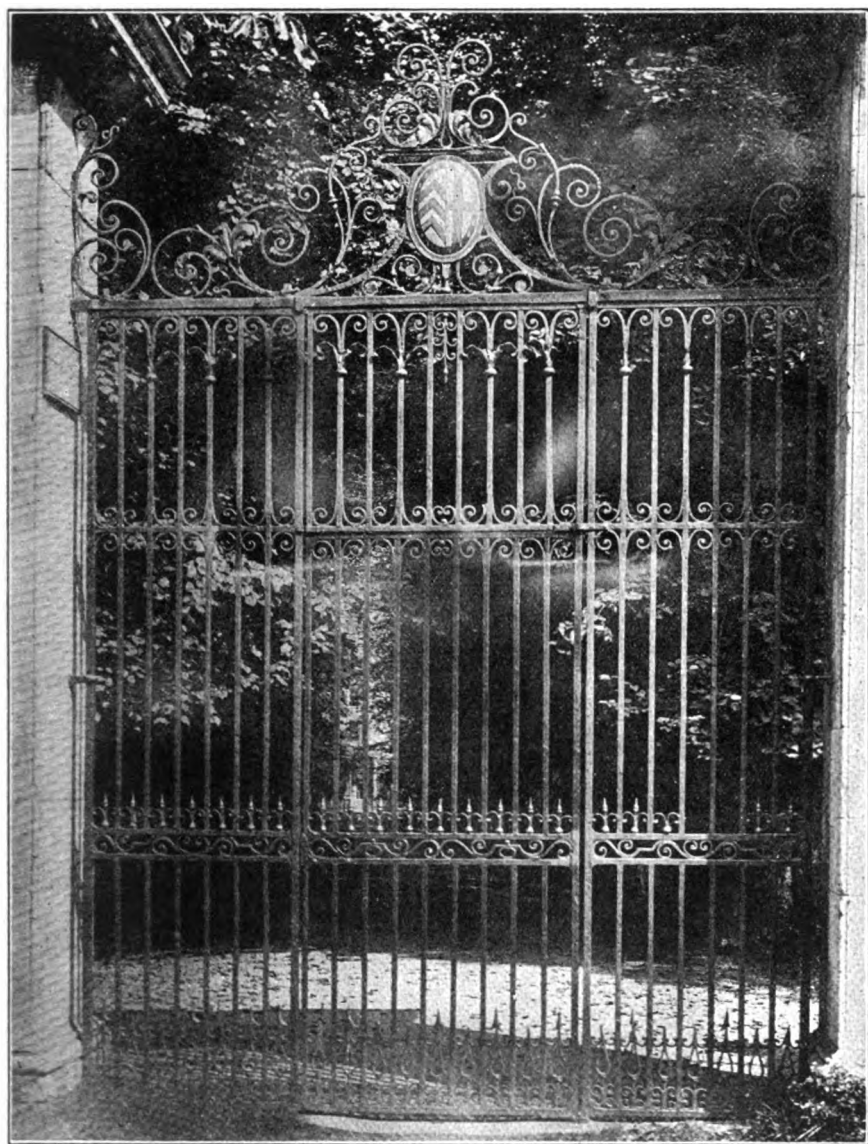


FIG. 4.—THE BACK GATE OF CLARE COLLEGE AT CAMBRIDGE UNIVERSITY

may fill the shop container several times from the other one. In this way, we should always have only a moderate amount of the gas in the shop tank; so that considerable temperatures—such for example as 160 degrees, Fahrenheit—would produce only moderate pressures.

The ordinary oxy-acetylene or ordinary oxy-hydrogen torch is not especially adapted for using this new gas. The reason lies in the fact that more oxygen is required.

A special torch should be employed.

When using the gas from a tank, the supply should be drawn from the bottom, in order to secure the gas in such condition that the ethane, propane, etc., are well mingled together. If the gas is drawn from the top of the container, one is liable to get an imperfect mixture, which will differ as the withdrawals go on. The result to be expected is the necessity of continually changing the feed valves in



When the drill bits are finished and tempered they are placed in a similar rack, sorted by sizes called the "sharp rack." From this rack they are taken to be returned underground, and loaded on a car to be pushed (or carried one by one) to the shaft collar. At the collar they are all loaded again into a skip or tied upon the cage. Thus:

- (1) Unloading from skip.
- (2) Loading to a car.
- (3) Unloading to "dull rack."
- (4) Sharpening.
- (5) Tempering.
- (6) Loading to "sharp rack."
- (7) Loading to car from rack.
- (8) Loading into skip or cage;

all means that a ton or two of steel is handled eight times by man power after it comes on top.

Six of these motions are wasted. Two tons of steel handled six times are equal to the handling 12 tons more than is necessary, and somebody is paying for the energy required. When the cage reaches the various levels underground the steel must be handled again.

Miners frequently stand and wait for the skip of steel to come down, and someone is paying for their time. Here the first ones grab what they want, while the last who get to the steel are frequently short of sizes. The result is decreased progress and decreased tonnage.

Again. Sometimes there are two or more different kinds of machine drills in use in the same mine. When all the dull steel and sharp steel is handled together by top men, who never go under ground, the steel for the different drills becomes mixed. The top men do not know which levels or places in the mine are using the various kinds of steel. The sorting of mixed steel on the levels wastes much time and energy, and someone has to pay for this.

The management frequently figures that it requires a certain number of pieces of steel for each drill in use. He then doubles the number, figuring that one set of steel will be in the blacksmith shop, while the other set is in use. If a piece of steel gets buried in the muck, falls behind the timbers, breaks, batters, or is a little out of gauge so that the next length will not "follow," the miner loses time. To prevent this the miners get "plenty" when they can, leaving some other workman a short allowance. We have many times seen miners grabbing steel at the station; the first ones will take several extra starters,

while the last ones get only long steel, and waste much time trying to get the holes started with them. Besides the inconvenience of having the machine set up too far from the work. We have also seen miners rustling steel all over the mine to get what they needed.

All this human energy and waste time is paid for by the company.

If we require 100 H. P. for one minute to run a hoist, and no power at all for the next 19 minutes, we must install and maintain a plant big enough to furnish 100 H. P. any minute, and every minute—yet our horsepower over the 20 minutes averages only 5 H. P. We are therefore maintaining a 100 H. P. plant to obtain 5 H. P. and similarly we are maintaining a 40-man power

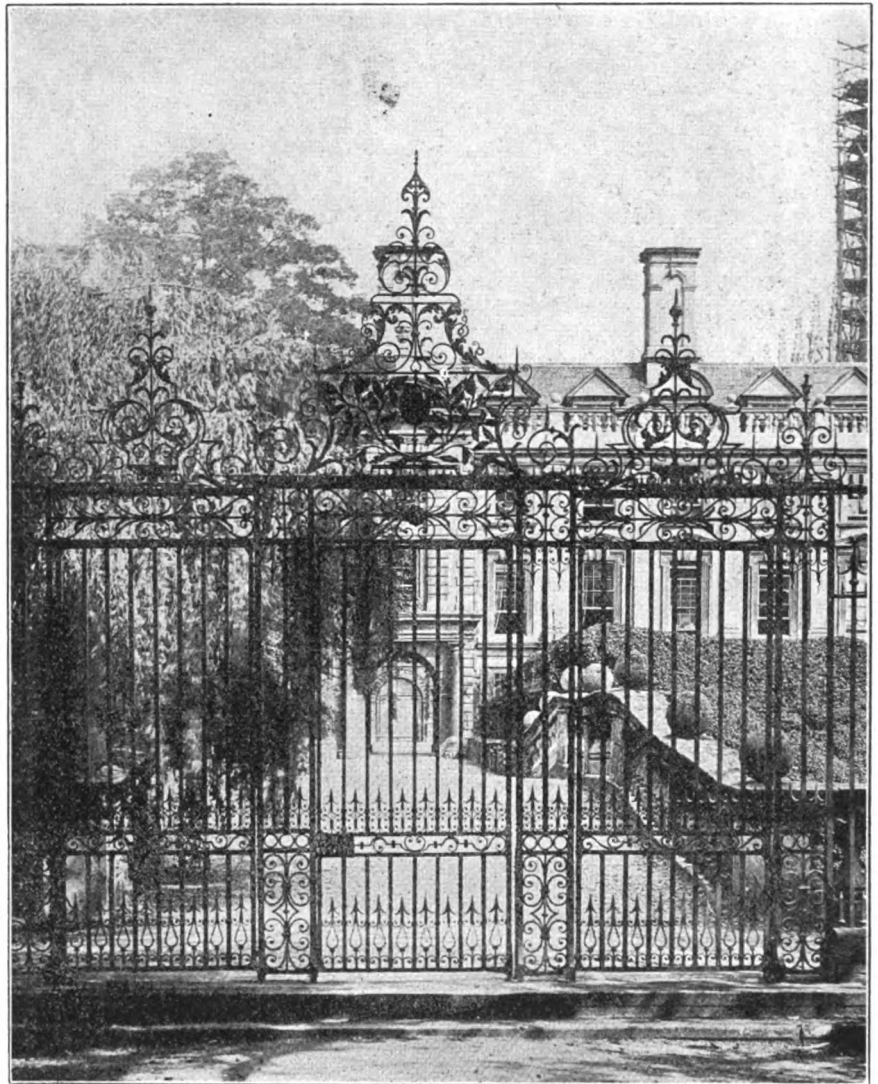


FIG. 6.—THE CLARE COLLEGE BRIDGE GATE AT CAMBRIDGE UNIVERSITY

just the same as electric power is paid for. It is the same thing as keeping up steam pressure in the boilers when the engines are not running. The load factor on your power plant is carefully computed, but the load factor upon the human power plant is ignored. The human power plant is as much more expensive over the steam power plant as a white mice power plant would be over a human power plant. No matter what our power requirements are, we must be prepared to carry our "peak load."

benefit. A strenuous effort for a 40-man power "peak load" with 20 men employed is overloading the workers.

You say 20 men ought to do as much work as 40 are doing.

Certainly, if you provide the 20 men with tools and equipments so that their work can be properly distributed into an even load; but to require them to waste half of their time handling steel, and getting things ready to work, is overworking the 20 men, to expect them to do 20 men's work in a half day.



Getting Property Back After it has Been put in Somebody Else's Name

Every reader of these articles who has real or personal property in somebody else's name, or who is liable to have, will be interested in the following. For obvious reasons I do not give the name and address of the writer:

Here is a ticklish situation, which by common consent of all of the members of this firm, we are putting before you. About two years ago one of the members of this firm became involved in a way which I need not go into, and it seemed advisable that he transfer everything he had to his wife's name. That included some real estate, some stocks, and his partnership interest in this business. In fact, the other members insisted that he do this, not wishing to see the business involved in a purely personal matter. The transfer was therefore made and for two years this partner's wife has been the legal owner of all his interests. There was no change otherwise, the partner himself getting the rents and the profits.

A difficulty has now developed between the partner and his wife, and she refuses to retransfer any of her holdings. She has also served notice on us, through a lawyer, not to pay any share of the profits of the business to anybody but her. Our lawyer says she has a right to do this. Meanwhile her husband, who I may say, is an extremely valuable member of this partnership, is getting disgruntled at our statement that we shall have to pay the profits to his wife and altogether it is an uncomfortable situation. Can you suggest any way to straighten it out?

I am not at all sure that it can be straightened out in the way this firm wants it to be. This is just another illustration of the danger of putting your property in the name of another. I have seen it done so often—husbands putting their property in the names of their wives; parents in the names of children; men in the names of brothers and sisters, and so on. Of course, everybody assumes that the people to whom the property is transferred will do the right thing and give it back when it is called for, and most of them do, perhaps. But there is always a chance that they may not, and when they do not, a very serious situation may develop. Holding property has a peculiar and unfortunate effect sometimes on people, especially people who have not been accustomed to hold it. Not long ago I was interested in a case in which a husband went into court with a petition to compel his wife to turn over to him certain building association shares, certain bank books and certain bank accounts. He foolishly had turned over control of everything to her. She handled it entirely as if it was her own individual property, and spent most of it, as it

afterward developed, entertaining other men. When the break came she refused to turn over what was left, hence the petition. The case has not yet been decided, and the issue is therefore uncertain. I predict, however, that he will get his injunction.

Now getting back to the correspondent's case, the only hope for

How can that be proven? It always ought to be proven by a written trust agreement. Such matters should never be left to verbal understandings, speaking especially from the standpoint of the actual owner, for it is he that runs the risk than the other man. There ought to be a carefully drawn agreement stating why the property is turned over,



A TYPICAL CLASS OF BOYS AT HIBBING LEARNING FORGING

the partner who is tied up is to take the same course, i. e., apply to the court for an order commanding his wife to turn over the property to him. Whether he will get it depends upon several things.

Was the property turned over to protect it from his creditors? If it was, he will probably not get it back now, for the court would say that he perpetrated a fraud upon his creditors, and they will not help him to get out of it now. But even if the court did make the wife turn it over it would probably do him no good, for it would then come within his creditors' reach again.

If it was not turned over to protect it from his creditors, he still may not get it back, if the court thinks he intended to give it to his wife. It is of course perfectly legal for a man to make a gift to his wife, and if he does it he cannot take it back again. He would have to prove that it was not intended as a gift before the court would think of making the wife give it back.

The owner of property who has put it in somebody else's name can get it back under practically one condition only—if he can prove that it was put in somebody else's name for perfectly legitimate reasons, upon the arrangement that the person to whom it was transferred was to act as trustee for the real owner. If that can be proven, the trustee will never be permitted to claim the property as his or her own, for that would be a gross fraud.

describing it, and on what conditions it is to be turned back. In many cases this is not done because it would defeat the object of the owner, which is to place his property beyond his creditors' reach. Where a man merely transfers his property to a trustee, he continues to have an interest in it, and his creditors can reach it. But where he does the other thing, and makes an absolute transfer without any tangible string to it, he always runs the risk, as I have pointed out, of not being able to get it back. It is always a risky matter to turn property over to another merely to keep your creditors from getting it.

(Copyright by Elton J. Buckley.)

Teaching Forging to Public School Boys.

JAY F. KNOWLTON

There is perhaps not a member of the craft nor a reader of THE AMERICAN BLACKSMITH who is not interested to some extent in what the public schools of our country are doing to improve the blacksmith's profession. Surely every real craftsman should be interested in what is being done for the future craft. Here at Hibbing, Minnesota, we are doing our part in looking after the future craft by teaching forge work to boys in the seventh grade, whose ages are from about ten years to thirteen and to the tenth grade boys whose ages are from fifteen years to eighteen years.



The seventh grade devotes three hours a week in the shop, while the tenth grade spends one and one-half hours every day except Saturdays. The engravings show examples of the work of each grade and the craft may judge as to the amount of skill they have acquired.

No doubt many of the readers

of work because of their love for it and because they are not in position to complete their high school studies and must go to work as a means of support to their parents. This summer finds two of the high school boys in the blacksmith's shops of Oliver Mining Company.

But even though we do make a

I could give a great many reasons for giving the work a place in our schools, but space will not permit me to speak of more than two of the great faults that we hope to overcome in the boys by giving them blacksmith shop work. These are; first, to teach the boy to work and to prove to him that work is the foundation of the world; second, to overcome that tendency to look upon labor with disrespect. If these last two tendencies of the boy can be overcome, then the forge work has been a success and rightly deserves a place in our schools.

The Hibbing boys are always told that there is money to be made in the blacksmith shop and that because some blacksmiths are not able to make the shop pay is no proof that the money has not been there, but rather a proof that some smith was a poor business man and perhaps a poor workman. In other words, there is always room in the trades for a real live bright boy or man.

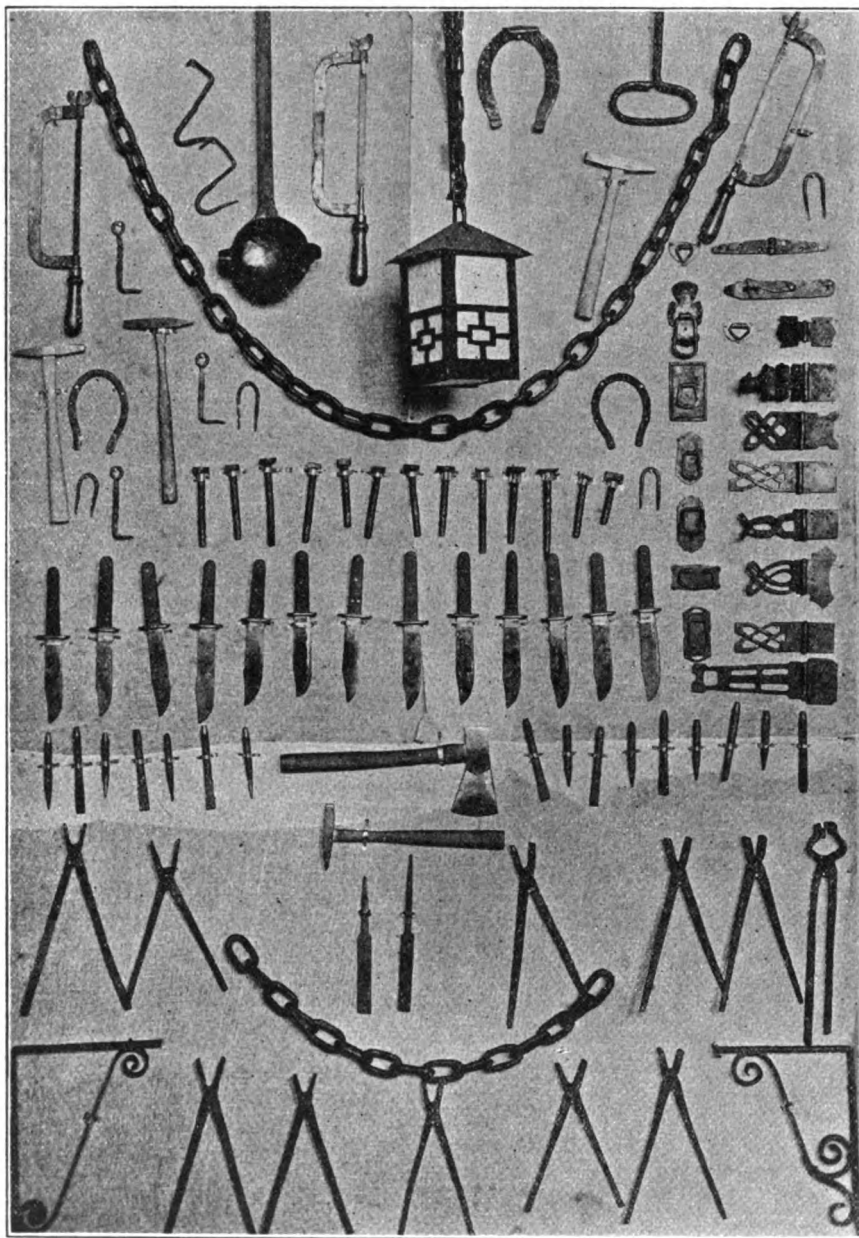
They are told also that any work that is honest is honorable, even though it be the blacksmith shop. It is very often difficult to make the boy see the difference between real dirt and what is called clean dirt. The blacksmith work comes under the class of clean dirt, while many of the other professions come under the class of real filth.

If space would only permit the writer would like to give other aims and results of the work at Hibbing, Minnesota, but he must be content by inviting any of the craft who happen to visit Hibbing to visit the Public Forge Shop of the schools, where the instructor, (an anvil ring-er himself,) will be very glad to show you a class of two hundred hard-working bboys in a neat, up-to-date shop, not equipped with all the up-to-date machinery but equipped like your own.

The Ten States That Protect the Craft

There are ten states—only ten—which have passed protective legislation especially for the blacksmith and horseshoers. Those ten states are: Alabama, Illinois, Indiana, Maine, Maryland, Michigan, Minnesota, Missouri, Oregon, Wyoming. All the other states report no lien laws nor examination laws in effect—except Florida, Georgia, Kansas, South Carolina, Utah and Virginia, from which states no report was received at time of going to press.

A digest of the laws in the ten



A DISPLAY BOARD SHOWING THE WORK DONE BY THE HIBBING SCHOOL BOYS

think that this work is given in our schools to make more blacksmiths, and we hope it does, but this is not our general aim. It is true that some boys want a trade and after spending some time in the shop they decide to become blacksmiths, and to these boys we give a special course so that they can go into the commercial shop and earn a regular salary. These boys choose this line

few blacksmiths out of the boys it is not our general aim. The aim is to give the boys a working knowledge of iron and steel, and to train their hand and eye to the use of a hammer, to judge distances and weights, to train their eyes to see a shape as it is and to remember it. It is found that very few boys can really see a certain form as it is. So we hope to train their observation.



states which have passed protective legislation for horseshoers and blacksmiths is here given:

ALABAMA.—The lien law in this state applies to work on vehicles, but according to the secretary of state does not apply to the shoeing of horses.

ILLINOIS.—This state has just recently passed a law providing for the examination of horseshoers and for the licensing and regulating the business and fixing penalties for violation of the law. This bill is known as House Bill No. 15.

INDIANA.—This state passed a lien law in March which gives the blacksmith and horseshoer the right to file a lien on animals shod and on vehicles repaired for reasonable charges for the work performed. This lien having precedence over all other liens or claims on the animal or vehicle.

MAINE.—In Chapter 57 of the Public Laws of Maine 1905—Section 1, provides: "Whoever performs labor by himself or his employees in manufacturing or repairing the iron-work or woodwork of wagons, carts, sleighs and other vehicles by direction or consent of the owner thereof, shall have a lien on such vehicle for his reasonable charges for said labor and materials used".

MARYLAND.—This state has arranged for the examination of horseshoers. Mr. D. R. Hoffman, 1826 W. Baltimore Street, of Baltimore, Ind., c/o Maryland State Board of Examiners of Horseshoers will give information relating to the examination and regulations.

MICHIGAN.—Act No. 229 of Public Acts 1899 and amendment Act No. 205 of Public Acts 1909, arrange for the examination and registration of horseshoers and persons practicing horseshoeing.

MINNESOTA.—The General Statutes of 1913, Chapters 7,041 to 7,052 refer to horseshoers.

MISSOURI.—The new lien law passed in this state will be found in the 1915 Session Acts of Missouri.

OREGON.—This state has a lien law which allows "any person who shoes a horse or other animal" to file a lien upon such animal for his reasonable charges for shoeing.

WYOMING.—Section 3753, Wyoming Compiled Statutes 1910, contains the general provision in regard to laborers' liens on personal property. It includes "any mechanic, artisan, or other person who shall make, alter, repair, or bestow labor upon any article of personal property", or who shall furnish materials therefor and gives such person

a lien on the property for the labor and material.

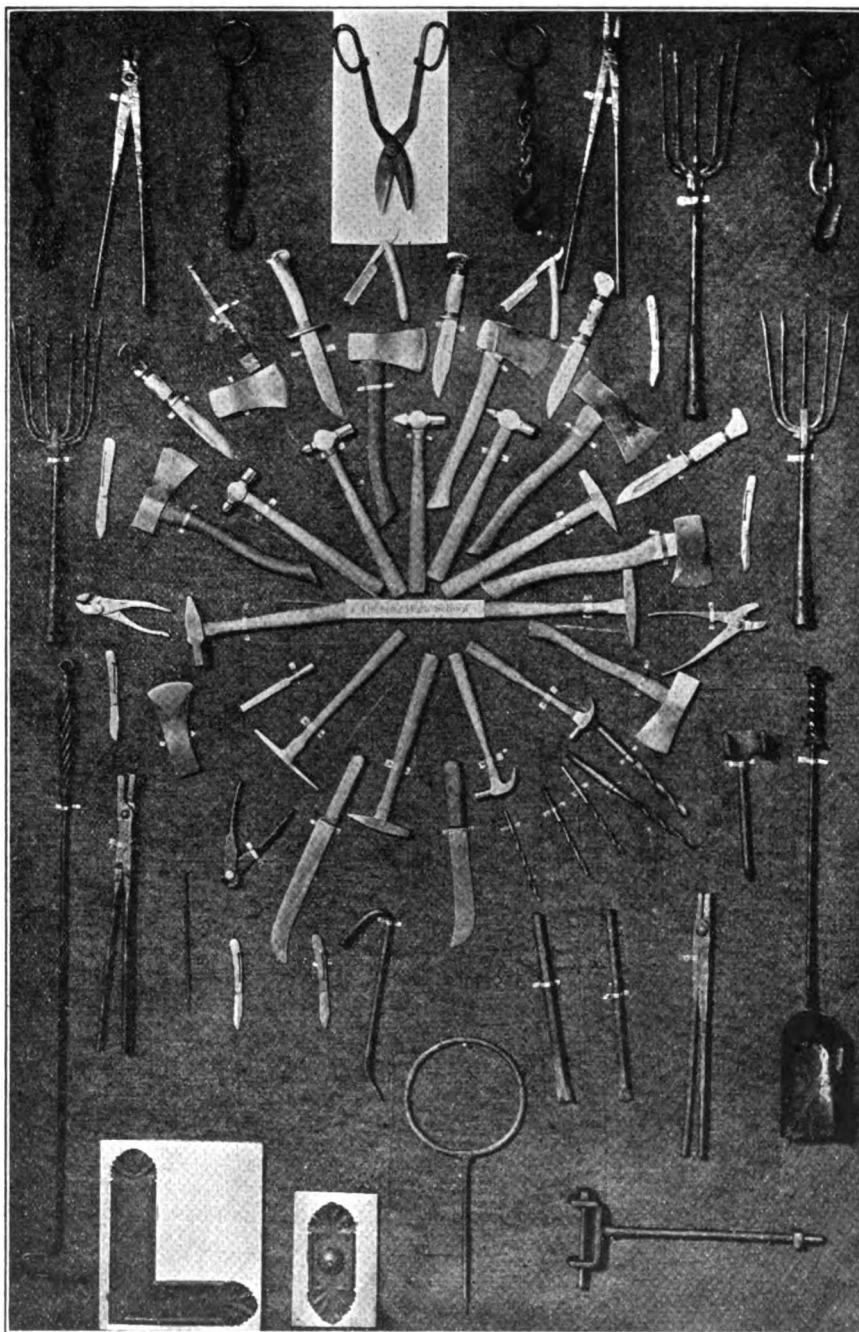
Thoughts on Timely Topics

By THORNTON

Caustic Censure and Cheery Comment

ELECTRICITY has become so common in the smith shop these days that its work beside the anvil and forge no longer causes any comment.

of the electrical worker it is known as "juice", but "grape" is "something else again". The favorite and most popular pastime of E. Lectricity is to twirl the blower. This it does most efficiently, saving the smith's delicate arm for more strenuous work and also saving him time which he needs to spend his money—of which he has altogether



THE WORK DONE AT HIBBING FORGE SCHOOL BY THE ADVANCED STUDENTS

But that it saves a great deal of muscular energy and time for the smith there is no longer any doubt. It's used for about everything these days, except as a substitute for grape juice. Though in the parlance

too little. (You can take that either way—supply your own word). But to resume—the little electric current is also right at home operating a drill press or any of the other machines in the modern smithy. It does



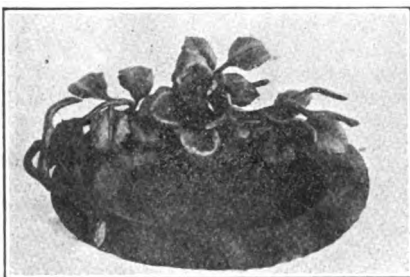
its work with "quickness and despatch" and is always ready to get busy. It is a loyal, tireless worker, never has to be jollied into accepting a raise in pay, needs no coddling, never punctures a tire nor does it



A ROSE SPRAY BY MR. CRAN

skip in any of its cylinders. And when it figures on the lighting of the shop, the little invisible atom of irrepressible energy has the Standard Oil octopus beaten to the ropes and asking for mercy. As a lighting and illuminating agent the electric current is a shining example of what most folks should be, but are not. It's installation in the smith shops of the elite has enabled the proprietors thereof to put off their morning opening of the shop doors until at least 4.00 A. M., and then too its usefulness at the other end of the day is not to be sneezed at. For it gives the poor overworked smith no valid reason for refusing to shoe two teams of "bulls" and a driver after 5.30 P. M., and to come home to a supper that has been burned crisp and dark-brown for an hour or more before his arrival home. Yes, sir, electricity is a great thing in the smith shop—a great thing!

ELECTION TIME will soon be with us again with its platter mate, the



ANOTHER EXAMPLE OF MR. CRAN'S ABILITY

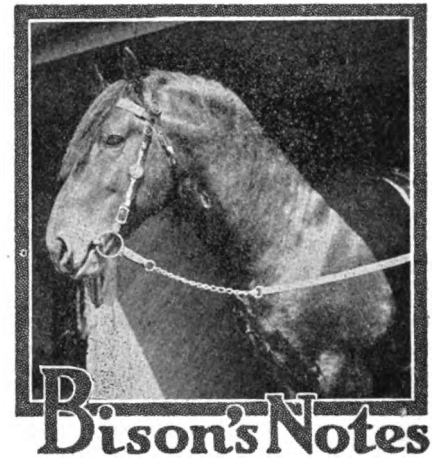
professional candidate, who with enlarged mitt, smile and heart will grasp the soot stained hand of the honest smith as though the son of the forge were his long lost brother. And then the busy anvil ringer will be forced to listen to a mixture of $\frac{3}{4}$ bunk, $\frac{1}{8}$ hot air and the remaining quantity of pure bull, that is calculated to impress the listener with the extreme honesty, loyalty and

purity of the orator and his unqualified fitness for the position open at the spigot of the public pork barrel. And if after listening for two hours to the long-winded tirade of emptiness and volatile promises of one of these professional candidates, the smith is not whirled off his feet and into the ranks of the said orator's followers, the victim (said smith) will have to have a will of steel, an iron determination and several very well set cemented opinions. All of which leads me to remark at this time, that if folks would use as much care in choosing candidates as a smith does in picking his forge coal, we'd have fewer scandals in public office such as have besmirched several of our cities and states. A bit more judgment on the part of the voter will put a bit more quality in the candidate.

NOTHING is any better than the majority of the people want it to be and political candidates are no exception to the rule.

A READER OF THIS COLUMN objected the other day to what we said about the farmer. And so we rise with our mighty Waterman and indite a few remarks on the subject. The reader in question while objecting to some of the things we said about "alfalfa chewing yaps" and "horney handed sons of the soil", seemed to admit that what we said was true of some of the farmer class. And, of course, that is just the section of the grangers that we referred to. Far be it from us, Brother, to put all farmers in the class to which we referred some months ago. There are few folks on this little old planet of ours that realize more thoroughly than yours truly, how much we depend upon the agriculturist. If it wasn't for the farmer there's many a smith shop in this country that wouldn't be worth a powder factory in Belgium, as far as profit for the owner is concerned. There was no intention to put all farmers in the same class any more than we would class all smiths as Tom Tardys. But there are too many penny-pinching alfalfa-chewing yaps in the farming business. We're glad to see the farmer getting rich. We're glad he's able to buy automobiles, tractors and gas engines. We're glad he gets a good price for his product. But when he objects to a fair and square price and profit for the smith, we almost get red in the face and tear off our collar.

Loose Business methods usually make money tight.



W. J. Andrews suggests new racing ideas—Nancy Hank's Dead—Yedno, the sensation at Montreal—Hambletonian's grave—Records broken at Randall, Ohio.

The well-known grand circuit trainer W. J. Andrews, who became famous in the harness racing world when a very young man, has captured the world's record for pacers nearly twenty-five years ago with Mascot 2:04, has some original ideas on harness racing methods which he believes would add vastly to the popularity of harness racing if adopted. Andrews, who is a native of Western New York, is one of the shrewdest men who ever adopted the profession of training and driving race horses. After he made Mascot the pacing champion he had various other high class horses and then he flashed another champion, the pacing stallion John R. Gentry 2:00½. Then a few years ago he brought out the famous trotting mare, Hamburg Belle 2:01¼, and the two heats he drove that mare in 2:01¼ and 2:01¼ when, with her, he defeated the present trotting champion, Uhlman 1:58, still constitute the world's race record for one and two heats. This year Andrews is back in the limelight with the sensational four-year-old trotter, Lee Axworthy 2:03¼, and the race he drove, and won, with that colt recently against the sensational Peter Volo, a couple of weeks ago, is declared by race goers of long experience to be the finest exhibition of reinmanship and race track generalship that they ever witnessed. Andrews uses his brains as well as his hands in his races. By the same use of his brains he has amassed a very comfortable fortune, and his recent suggestions regarding the necessity if making some changes in harness racing methods shows that he has given that subject the same thorough study he gives to the work connected with his profession. Briefly summed up Andrews' views, as recently expressed are:

Nothing is gained by continuing a system of racing which results in the grueling five and six-heat contests which mark the old three-in-five system of racing. People interested in racing want to see speed and dash and if the plan by which every race will end at the conclusion of the third heat with each heat a race for a part of the purse, gives them just what they want. The three-heat plan also permits the trainer to train his horses for a certain number of heats; the result is that horses have more vitality, more speed and can race up to form more weeks.

Andrews also believes that if harness racing managers would pay more attention to the wishes of the public in formulating racing methods and less to the men who



train horses and who naturally are looking to their own interests, they would do much towards increasing the popularity of the sport. Most of the other trainers thinks so too, but hey do not come out and say so for selfish reasons.

The former trotting queen, Nancy Hanks 2:04, that was named after Abraham Lincoln's mother, and whose record was also the world's record for trotters of any sex, died a few days ago at John E. Madden's Hamburg Place, breeding stud in Kentucky. Nancy Hanks was far and away the greatest speed producer among the mares which have held the trotting championship. As a rule ill-fortune has pursued the trotting queens in the stud. Goldsmith Maid, 2:14, the first mare to become champion after the world's record

1904—Malcolm Forbes, b. c., by Bingen, 2:06 1/4. Sire of Silk Forbes, 2:25.

1903—Palema, b. b., by Bingen, 2:06 1/4. Dam of Lema Worthy, 2:26.

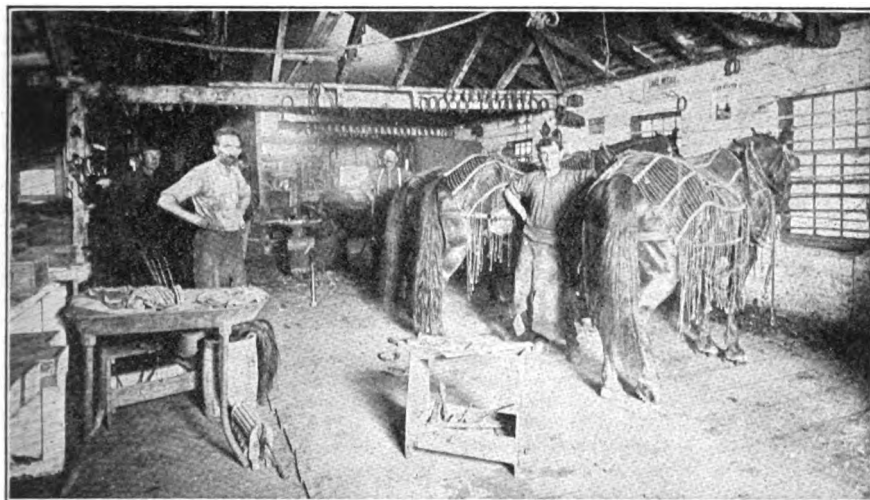
1906—Nancy McKerron, b. b., by John A. McKerron, 2:04 1/2. Record, (3), 2:10 1/2. Dam of Hob Hob, (3), 2:17 1/4.

1907—King Todd, b. c., by Todd, 2:14 1/4.

1908—Nancy's Todd, b. b., by Todd, 2:14 1/4.

Nancy Hanks did not possess a drop of the blood of either George Wilkes or Electioneer, other than she received through her sire, Happy Medium and her dam's sire, Dictator, both those horses being sons of Hambletonian, as George Wilkes and Electioneer were. Added to her Happy Medium and Dictator blood she got a strain of blood from Edwin Forest and from Pilot, the sire of Pilot, Jr. Her family promises

cut sensation of the early 90's, the pacer, W. W. P., 2:05 1/4. Yedno, however, is not the only high class pacer the Canadians have sent over to the States to race this year. On account of the war in which Canada is so vitally concerned, harness racing in that country has not enjoyed its usual boom this year, consequently a large number of the good Canadian stables have been racing on the tracks this side of the line. Most of them have been racing on the half-mile tracks, but they have won a pretty fair share of the money offered and their owners will go home this fall pretty well fixed. Among these Canadian pacers that have been winning races in this country this summer are Grand Opera, 2:05 1/2; Little Alpred, 2:05 1/4; Billy Bonio, 2:07 1/4; Tredel, 2:09 1/4; Texas Jim, 2:09 1/4; The Indian, 2:09 1/4; Bonnie Cope, 2:09 1/4 and Eal Direct, 2:11 1/4. Add to these Yedno, 2:02 1/4, and it will be seen that the Canadian pacing contingent in this country is a pretty strong one.



INTERIOR OF MR. W. D. STORER'S, YORK STATE SHOP. MR. STORER AND HIS HELPER MR. PLINZ SHOWN IN REGULATION TADE UNIFORM

was dropped below 2:15, produced only two living foals. Maud S. 2:08 1/4, died without having produced a foal. Sunol 2:08 1/4, had but one or two that lived. Alix 2:03 1/4, was likewise unfortunate, producing but two or three that lived to reach maturity. Lou Dillon 1:58 1/2, is, however, proving a regular producer and every one of her foals trained has shown a high rate of speed. Nancy Hanks, however, occupies an unusually prominent position among brood mares, for not only is she the greatest speed producer among the champion mares, but she also occupies a place among the select few mares that have produced two or more 2:10 trotters each. Producing her first foal in 1896, Nancy Hanks produced eleven foals as follows:

1896—Narion, b. b., by Arion, 2:07 1/4, Dam of Albia, 2:08 1/4; Vice Commodore, 2:11, (sire of Margaret Parrish, 2:06 1/4, etc.); Darion, 2:29 1/4.

1898—Admiral Dewey, b. c., by Bingen, 2:06 1/4, Record 2:04 1/4, sire of Lord Dewey, 2:03 1/4 and 44 others.

1899—Princess of Monaco, b. b., by Meddler, (thoroughbred). Dam of Hanks Bellion, 2:11 1/4; Vanitza, (3), 2:29 1/4.

1900—Lord Roberts, b. c., by Arion, 2:07 1/4, Record, 7:07 1/4. Sire of Lady Venus, 2:12 1/4 and 31 others.

1901—Markala, b. b., by Peter the Great, 2:07 1/4; Record, 2:18 1/2; Dam of Walnut Tree, (2), 2:18 1/4.

1902—Ondawa, b. b., by Bingen, 2:06 1/4 Crippled, untrained. Dam of Lema Worthy, 2:26.

to be a large one despite the fact that her fastest son, Admiral Dewey, died soon after reaching mature years.

The performance of the Canadian pacing mare, Yedno, at Montreal recently, where she placed her record at 2:02 1/4 in the third heat of her winning race, was one of the sensational performances of the year, and not a few good judges who have seen this mare race are of the belief that she would be the first pacing mare to take a record below two minutes if she were to be given the special preparation which usually accompanies a world's record breaking feat. Yedno has had a rather varied career. She was bred up in Montana and when young passed to a Vancouver man. She raced some up in the Canadian Northwest but was not regarded as out of the ordinary. A trainer who liked her finally bought her and brought her to Eastern Canada last winter and raced her on the ice at Toronto and a gentleman of that city bought her. About six weeks ago her present owner, F. J. Daly, of Peterboro, Ont., bought her and since then, first on the half-mile tracks and then on the mile tracks she has continually astonished race goers by the wonderful speed she has shown. She was sired by the pacing stallion, Bob Fitzsimmons, 2:07 1/4, a great-grandson of Electioneer, that was prominent on the Western tracks a few years ago, and her dam, Golden Silence, was a daughter of Gold, a well-bred son of Director, 2:17, while her second dam was by Ben Lornond, the sire of the grand cir-

When the famous trotting stallion Hambletonian (Rysdyk's), the head of the famous family of trotters which bears his name died in 1876, he was buried at Chester, the Orange County town in Eastern New York where he had been owned, and on his grave a handsome white marble shaft, appropriately lettered was placed. For a time this shaft was visible from the railroad passing through Chester and from the main road passing through the village. As the town grew buildings were erected which prevented strangers passing through the town from seeing the monument over the famous sire's grave and a few weeks ago a few prominent trotting horse fanciers of Orange County took up the great stallion's bones and reinterred them on a site plainly visible to all travelers through the town, either by rail or other conveyance, moving at the same time, the marble shaft on which are recorded his achievements in the stud. Orange County has long taken great pride in being the birthplace and life-home of Hambletonian, and well it may, for fully ninety-five per cent. of all the trotters which have taken standard records, carry one or more crosses of his blood, which includes every one of the forty-six that have taken records from 2:05 to the 1:58 Uhlman.

Quite a few world's records have been broken by the trotters and pacers this year, but the real record breaking season, especially in the colt division, is yet to come. The most sensational of the record breaking performances were those scored at North Randall, O., in the match race between the four-year-old stallions, Lee Axworthy and Peter Volo. The last named colt won the first heat in 2:02 which cut a second and a quarter from the previous world's record for a four-year-old trotter. Lee Axworthy won the next two heats in 2:03 1/4 and 2:04 1/4, setting a new record for a three-heat race of divided heats. In his match with Directum I. the pacer, William, set a new world's record for five-year-old pacers when he won the first heat in 1:58 1/4. The pacing mare, Flower Direct, in her race at Grand Rapids, set a new world's record for a two-heat race by a mare when she paced in 2:00 1/4 and 2:02 1/4. Two world's records were also made at Goshen, N. Y., a few days ago. Nathan Axworthy set a new record for a three-heat trotting race on a half-mile track when he trotted in 2:09 1/4, 2:10 1/4 and 2:09 1/4.



The Village Blacksmith

FRANK SWISHER will teach you the modern dances for \$5. Call at his blacksmith shop.

(Ad in the Walnut Grove (Mo.) Bee.)

Under a spreading tango tree
The village smithy stands;
The smith, a graceful man is he,
With dainty, comely hands,
A wrist watch peeps from 'neath his cuff,
Attached to jeweled bands.

Week in, week out, from morn 'till night,
You hear his graphophone
Grind out its squeaky melodies,
The while the girls are shown
Just how to dance the fox trot,
To its harsh and scratchy tone.



Heats, Sparks, Welds

And now begins volume fifteen.

A typewriter operated by the feet has been invented for the benefit of people who have lost their arms.

Better bind up volume fourteen now before you lose some of the numbers. Ask our Subscribers' Service Bureau about binders. They hold your copies neatly, cleanly and compactly.

Aluminum Paint on shoes before they are applied is a little service stunt we saw recently in one shop that may well be copied where a shoer is getting a price that will cover the cost of the coal he uses.

None too early right now to prepare for winter, is it? Every tool in readiness, winter calks and shoes in stock and handy, sleigh goods for emergency—are you ready for wintry winds and roads of ice and snow?

A Reward is offered for new subscribers. Get your neighbor smiths to join our big circle of satisfied subscribers and we will make it well worth your while. You know "Our Journal" and what it has done for you. Tell your neighbor and let us help him.

Is your organization really doing things? Or does it simply sit around and talk? Get some real ginger into it. Don't be content to let things go. If things need reforming the thing to do is to reform 'em. An organization to do any good must do things. Does your organization do things?

"The Service Paper" is the way readers

refer to "Our Journal" after they've had a sample of Our Subscriber's Service. Pretty good name too. Is your shop called the "Service Shop"? Wouldn't it be a good idea to make it that? Try it and see if it doesn't pay you in more ways than one.

Cut the high cost of living by taking advantage of Our Long Time Rates. You can cut your subscription costs right in half. And then too, think of the advantage of not giving another single thought to your subscription account for several years. The Fix-It Shop is paid up to July, 1935.

Yes, advertise if you can write an advertisement. There's a difference between saying something in an advertising way and just simply talking. An advertisement to be an advertisement must say something that means something and then it must tell the reader something that will mean something to him.

Wouldn't it be interesting to know why your customers are your customers and why your non-customers do not trade with you or at your shop? One can hardly imagine the limits to which this information could be used and how it would improve and increase your business. Why not find the why of your business if you don't already know it?

Do you know that "Our Journal" can give you individual help in practically any capacity connected with your business and trade? We don't expect you to find every bit of information and help you may want and need, in these pages. That's why we tell you to tell us what more we can do. That's what Our Subscriber's Service Department is for and that's what it does.

Have you been one of the hundreds of contributors to our columns during the past year? If not, now is a good time to make up for lost time. Every reader of "Our Journal" is expected to send in something for publication at least once each year. If nothing from your pen or pencil appeared in the volume just closed, better send in something now. Don't keep us waiting. We want something from you.

Some folks keep books to fool themselves into thinking that they are doing a big business. At least, that was the reason brought out in a recent local bankruptcy case. The business was suffering a continuous loss but by a manipulation of figures the books showed an increasing profit and apparently a business that was successful and growing. Needless to say, the book figures didn't keep the business out of bankruptcy court nor save the proprietors from a total loss of not only the business, but money, capital and reputation.

"How's business?" was our greeting as we happened into Tom's shop the other day. "Oh, so so" was friend Tardy's reply as he resumed his reading of the current number of a sensation-loving popular magazine. When we suggested a slack period as being an excellent time to clean up and fix up, Tom remarked that it "wasn't no use, I no sooner git started at clean' up a bit when somebody comes in with a job or something". "If that's so" we remarked "an attempt to clean up would make business good, and we'd certainly work hard at it". But Tom Tardy's only remark was an uneasy mutter of

TRUE TALES OF OUR SERVICE

Number Ten.

A Western smith with a clever, inventive mind secured a patent on a little device which he planned on making during his spare time. The device called for several articles and items somewhat out of the line usually pursued by the blacksmith and our Western friend was puzzled on just where to get these things. He asked us and from the list of firms which we gave him, he made very satisfactory arrangements for the purchase of his supplies.

impatience as he buried his head still deeper into his magazine.

The International Railroad Master Blacksmiths' Association Convention and Election. The annual convention of the International Railroad Master Blacksmiths' Association was held August 17, 18 and 19 at the Hotel Walton, Philadelphia, Pa. After a three-day conference in the exchange of advanced and modern ideas the delegates closed their sessions with the election of the following officers: President, Mr. L. E. Williams of Davenport, Ia.; First Vice-President, Mr. W. S. Schofield, Chicago, Ill.; Second Vice-President, Mr. John Carruthers, Proctor, Minn.; Secretary and Treasurer, Mr. A. L. Woodworth, Lima, O.; and Official Chemist, Mr. George H. Williams, Medford, Mass. Next year's convention will be held in Chicago.

The Editor had the pleasure of visiting a shop recently that he wished every reader of "Our Journal" could see. This shop was just the very essence of neatness. Everything had a place and everything was in its place. They couldn't have been busy, you say? You should have been there when the editor was. The shop and everything about it had an air of business efficiency that is seldom seen. The usual marks of smith shop carelessness were refreshingly absent. Instead we saw a neat, clean, well arranged shop that looked as though it really meant business.

Look ahead now. The men who have done real things in any time in history, the men who have found success in business, the men whose names have come down to us across the centuries, have all been men who looked, saw and planned ahead. The future of the smithing craft, whether horseshoeing, vehicle or repair branch, will depend upon those men who can see into the future and plan according to what they see. There is no need or call for the man who can look forward, to become frightened. He is safe if he will lay his plans accordingly. But the man who disregards the signs of the times, the pointing finger of progress, and the unmistakable indications of the present day, may well wonder and question. Changes are occurring in the smithing trade and business. Are you keeping step with them? Are you modernizing your methods, your equipment, your ideas? Hark to the anvil ring of progress before it is too late. Heed the call of tomorrow and forget the whisperings of yesterday except as they may guide you into the future. The smith who will do these things will not be afraid but will journey with assurance and confidence into the future.



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D. C. Garber, Ohio.....	Feb., 1925	J. Hughes, Ohio.....	Feb., 1923
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J. M. Withers, Hawaii.....	Jan., 1925	S. P. Harney, Mont.....	Dec., 1922
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Geo. Tatam, Jr., Fla.....	Dec., 1924	F. Pablan, Neb.....	Dec., 1922
I. Clark, Va.....	Dec., 1924	P. Frederickson, Iowa.....	Nov., 1922
A. N. Estes, Va.....	Dec., 1924	L. O. Lehrs, Ill.....	Nov., 1922
J. Bailey, Man.....	Dec., 1924	W. Lawson, N. Zealand.....	Nov., 1922
E. G. Naylor, Md.....	Dec., 1924	W. O. Grant, Cal.....	Oct., 1922
P. Schicka, Wash.....	Nov., 1924	W. H. Miller, Iowa.....	Oct., 1922
H. E. Snyder, Ore.....	Nov., 1924	A. O. Martin, Idaho.....	Sept., 1922
J. A. Stewart, Ky.....	Oct., 1924	O. A. Mortimore, Idaho.....	Sept., 1922
C. Richenacker, N. Y.....	Oct., 1924	H. J. Wyatt, Wash.....	Sept., 1922
W. L. Berthoff, N. J.....	Oct., 1924	J. N. Skow, Iowa.....	Sept., 1922
J. W. Hewson, S. Africa.....	Sept., 1924	A. D. Standiford, Wash.....	Sept., 1922
Ed. Larson, N. D.....	Sept., 1924	T. Temkiewicz, Que.....	Sept., 1922
R. T. Monk, Ill.....	Sept., 1924	A. Pfeiffer, Ohio.....	Aug., 1922
W. T. De Young, Ill.....	Sept., 1924	W. D. Valentine, Iowa.....	Aug., 1922
Chas. Wells, Colo.....	Aug., 1924	G. Hoffman, N. Y.....	July, 1922
H. G. Weaver, Pa.....	Aug., 1924	J. Erman, Ark.....	July, 1922
Working Men's College, Viet. June.....	June, 1922	W. K. W. Hansen, Penn.....	June, 1922
F. M. Kenoyer, Nebr.....	June, 1922	Robert Tochter, Cal.....	June, 1922
R. C. Frederick, N. D.....	May, 1924	J. Van Marter, N. Y.....	June, 1922
H. L. Fenton, N. Mexico.....	May, 1924	F. Norrie, Yukon, Ty.....	Jan., 1922
J. Carl, Iowa.....	May, 1924	E. Anders & Son, S. Australia.....	May, 1922
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H. L. Brenzel, N. Y.....	Apr., 1924	S. Smith, Tex.....	Apr., 1922
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F. Jacobs, Ohio.....	Feb., 1924	H. Feldus, Neb.....	Sept., 1921
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E. O. Walker, Cal.....	Jan., 1924	E. Stoe, N. Y.....	Feb., 1921
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E. Fowler, Pa.....	Jan., 1924	G. A. Moffatt, Yukon Ty.....	Jan., 1921
Breen & Son, Ireland.....	Dec., 1923	T. P. Consodine, Mass.....	Dec., 1920
M. Lamoreaux, Ohio.....	Dec., 1923	R. D. Simkins, Penna.....	Sept., 1920
C. R. Davis, N. Y.....	Dec., 1923	A. E. Reeve, Mass.....	Sept., 1920
F. W. Copeland, Kansas.....	Dec., 1923	C. Gibson, Ill.....	July, 1920
J. L. Tomlin, Kansas.....	Dec., 1923	H. M. Wittman, Neb.....	July, 1920
H. A. Davis, N. Y.....	Dec., 1923	G. M. Robben, Kans.....	July, 1920
E. H. Troyke, Ill.....	Dec., 1923	D. Hardy, Viet.....	June, 1920
D. B. Johnson, Iowa.....	Dec., 1923	E. Malinas, S. Australia.....	June, 1920
S. Horton, Cal.....	Nov., 1923	A. J. Hamburg, Ohio.....	June, 1920
J. Spratt, Mass.....	Nov., 1923	C. M. Holton, Okla.....	June, 1920
F. Watkins, N. H.....	Nov., 1923	C. L. Graf, Ohio.....	June, 1920
J. Koppins, Ala.....	Nov., 1923	A. Mellum, N. D.....	June, 1920
W. C. Liernert, S. Aus.....	Oct., 1923	Alex. Zimmer, Ont.....	Apr., 1920
W. B. Abell, N. Y.....	Oct., 1923	Clark Bros., Cal.....	Mar., 1920
W. R. Turner, Man.....	Oct., 1923	W. H. Leonard, Penn.....	Mar., 1920
C. Nelson, Nebr.....	Sept., 1923	Ed. Grimm, Tex.....	Mar., 1920
H. M. Anderfuren, Calif.....	Aug., 1923	H. L. Place, S. Australia.....	Mar., 1920
Cramp Bros., Tas.....	Aug., 1923	J. Hiernzy, Minn.....	Mar., 1920
L. C. Larsen, Iowa.....	July, 1923	G. S. Aukers, Va.....	Mar., 1920
S. Effensar, S. Africa.....	July, 1923	J. F. Leiss, N. J.....	Feb., 1920
G. L. DeWitt, Mont.....	July, 1923	C. M. Jacobsen, Utah.....	Feb., 1920
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A. Luke, Nebr.....	Dec., 1919	J. Gray, Scotland.....	Dec., 1918
L. F. Keilholz, Penn.....	Dec., 1919	W. J. Morris, Queens, Aust.....	Nov., 1918
J. W. Rupp, Wisc.....	Dec., 1919	W. Tait, New Zealand.....	Nov., 1918
F. G. King, N. Y.....	Dec., 1919	A. Larsen, New Zealand.....	Nov., 1918
W. Vallance, New York.....	Nov., 1919	B. E. Russell & Son, Penn.....	Nov., 1918
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J. Delane, Neb.....	Nov., 1919	D. MacDonald, N. S. Wales.....	Nov., 1918
P. Gudmunson, S. Dakota.....	Nov., 1919	C. A. Ritchie, Scotland.....	Nov., 1918
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J. Naismith, N. Zealand.....	Nov., 1919	G. E. Hardestie, N. Y.....	Nov., 1918
W. H. Lick, Ohio.....	Nov., 1919	C. Ebebe, Iowa.....	Nov., 1918
W. H. Spicer, Ky.....	Oct., 1919	J. L. Peffer, Penn.....	Nov., 1918
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T. Russell, N. S. Wales.....	Oct., 1919	F. R. Tomlinson, Kansas.....	Nov., 1918
J. Alston, Viet.....	Oct., 1919	A. Rhea, Ill.....	Nov., 1918
M. Pople, N. S. W.....	Sept., 1919	C. A. Bouvroulour, Ill.....	Nov., 1918
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A. F. Stickle, N. Y.....	Sept., 1919	Cyclone Gate & Fence Co., South Africa.....	Oct., 1918
A. E. Reeve, Mass.....	Sept., 1919	W. Alson, Minn.....	Oct., 1918
T. B. Smart, Mo.....	Sept., 1919	H. P. Bowerman, N. D.....	Oct., 1918
Schmitt Bros., Ill.....	Sept., 1919	P. Deverney, Viet.....	Oct., 1918
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E. Underwood, S. Africa.....	Aug., 1919	Platt & Braman, Minn.....	Sept., 1918
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W. F. Turner, S. Australia.....	Aug., 1919	A. Quay, South Africa.....	Sept., 1918
C. H. Smith, S. Australia.....	July, 1919	J. Wilkinson, Queens.....	Sept., 1918
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J. T. Wilson, S. C.....	July, 1919	J. F. Baggett, Queens.....	Sept., 1918
J. A. Moffett, Penn.....	July, 1919	J. Thorneycroft, N. W. Ter.....	Sept., 1918
W. Petrow, South Africa.....	June, 1919	W. A. Thege, Queens.....	Sept., 1918
I. B. Harey, Cal.....	June, 1919	A. L. Varrie, South Africa.....	Sept., 1918
Wright, Boag & Co., S. Africa.....	June, 1919	George A. Petty, Utah.....	Sept., 1918
F. Rasm, Sask.....	June, 1919	G. W. Hazlett, Penna.....	Sept., 1918
W. H. Hopper, Cal.....	June, 1919	C. Walter, Ohio.....	Sept., 1918
G. Jackson, England.....	June, 1919	T. B. Holt, Okla.....	Sept., 1918
E. G. Mullholland, Me.....	June, 1919	Robert Cook, Ky.....	Sept., 1918
Vinsten & Duncan, S. Africa.....	June, 1919	A. B. Wendlandt, Wash.....	Sept., 1918
W. F. Helmke, Tex.....	May, 1919	A. J. Brookman & Co., Viet.....	Sept., 1918
J. W. Delmore, Nev.....	May, 1919	Peter Cocks, W. Australia.....	Sept., 1918
C. H. McCormack, Kansas.....	May, 1919	R. J. Tompkins, Texas.....	Sept., 1918
M. Duboise, Miss.....	May, 1919	A. H. Morrill, Mass.....	Aug., 1918
R. Manske, Tex.....	Apr., 1919	L. Cooper, Ohio.....	Aug., 1918
Clyde Engineering Co., N.S.W.....	Apr., 1919	T. W. Johns, Garman Mills, Pa.....	Aug., 1918
A. Thompson, Fiji Islands.....	Apr., 1919	E. H. R. Schois, S. Australia.....	Aug., 1918
Theo. Paschke, Neb.....	Apr., 1919	J. Vascetti, Colo.....	Aug., 1918
I. M. Townsend, Calif.....	Apr., 1919	E. C. Puxton, S. Australia.....	Aug., 1918
G. Bish, Fiji Islands.....	Apr., 1919	V. D. Sibley, B. C.....	Aug., 1918
G. D. Gamble, Mass.....	Apr., 1919	L. Smith, Calif.....	Aug., 1918
G. Ingram, Va.....	Apr., 1919	W. Cribb, Queensland.....	Aug., 1918
J. H. Martin Mfg. Co., Ind.....	Apr., 1919	George Deed, South Africa.....	Aug., 1918
R. H. Kuhnrt, Iowa.....	Apr., 1919	H. Kelenboz, N. J.....	Aug., 1918
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Emil Halum, Minn.....	Mar., 1919	J. Meyn, Ill.....	Aug., 1918
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C. J. Vonblad, Penn.....	Mar., 1919	E. K. Sayles, Penna.....	July, 1918
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A. F. Bowman, Ohio.....	Mar., 1919	Gilbert Bros., South Australia.....	July, 1918
C. Williams, W. Australia.....	Mar., 1919	George Dash, New Zealand.....	July, 1918
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E. Raetz, Kansas.....	Mar., 1919	L. G. Reid, South Africa.....	July, 1918
A. Burke, N. J.....	Mar., 1919	J. M. Kunzier, N. J.....	July, 1918
D. Fraser, N. Zealand.....	Mar., 1919	Polzer Bros., Wisc.....	July, 1918
C. T. Haskins, N. Y.....	Feb., 1919	P. A. Stohl, Neb.....	July, 1918
N. E. Koch, Cal.....	Feb., 1919	A. G. Eck, Penna.....	June, 1918
C. W. M. Burroughs, N. J.....	Feb., 1919	O. Walters, Ill.....	June, 1918
L. Artner, Ohio.....	Feb., 1919	W. H. Jones, Texas.....	June, 1918
R. Taylor, N. Zealand.....	Feb., 1919	H. D. Church, N. Y.....	June, 1918
R. Strode, Ore.....	Feb., 1919	E. L. Herring, Fla.....	June, 1918
Lehnain Bros., Ill.....	Feb., 1919	M. W. Abts, Nebr.....	June, 1918
W. J. Andrews, Ark.....	Feb., 1919	M. Gilson, Ariz.....	June, 1918
O. N. Benninger, Penn.....	Feb., 1919	N. W. Lewis, Mich.....	June, 1918
H. G. Sebastia, South Dakota.....	Jan., 1919	R. J. Spring, N. Y.....	June, 1918
W. Harsenape, S. Africa.....	Jan., 1919	W. Prather, Ohio.....	June, 1918
J. J. Begerholm, Cal.....	Jan., 1919	F. Schloz, Iowa.....	June, 1918
L. A. Teiking, Kansas.....	Jan., 1919	F. W. Reiser, Ind.....	June, 1918
W. S. Wagner, Texas.....	Jan., 1919	George Chandelaine, Que.....	June, 1918
A. Mackenzie, W. Australia.....	Jan., 1919	J. W. Heneries, Que.....	June, 1918
M. Beck, New York.....	Dec., 1918	I. Boynton, Utah.....	June, 1918
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Brown & Scully, N. S. Wales.....	Dec., 1918	G. A. Brinson, Mo.....	June, 1918
A. Horstad, Minn.....	Dec., 1918		



Horseshoer

Criticising Horseshoers and How an Expert Made a Miss

DR. JACK SEITER

I just finished reading an article, written by a prominent "Author-Veterinarian", in one of our popular horse papers.

This man generally has an article of some sort in the paper every week, and the way he writes, and the "stuff" he tries to spread carries me back to my college days, because it, as a rule, refers to things that are so simple that any practical horseman knows them by heart—how to feed, groom and so forth.

In our college days the boys used to wonder why some learned professor would stand up for hours at a time, and lecture on just some simple subject as that—something we all knew before we ever attended college.

But the fact of the matter is, as I now look back, that after all, we were probably not all horsemen; something we should have been in order to take up the veterinary profession. I have actually observed students come to college who, even after attending a whole term, could not put a halter onto a horse and do it right. And to tie one up with a knot that could be untied without the aid of a set of tools, was too deep for them to comprehend at all. They were generally good, bright students, too, who, as a rule, averaged higher in their studies than their more practical college chums.

The writer I refer to, too, is doubtless one of this class. I have read his articles week after week and have tried to learn something at that, for it is a fact that by observing the mistakes and blunders made by others we can see our own loom up just so much stronger. We learn from a poor mechanic by taking no-

tice of his weak spots and thereby learn to strengthen our own, this also goes for the veterinary profession, or for that matter, any and all walks of life.

We are not to blame for our blunders or mistakes, or because we are not as good mechanics as our more gifted brothers, but we can try and learn first, and not try to teach the public; who is no doubt, willing to learn, but may know as much of the subject as we are trying to teach it.

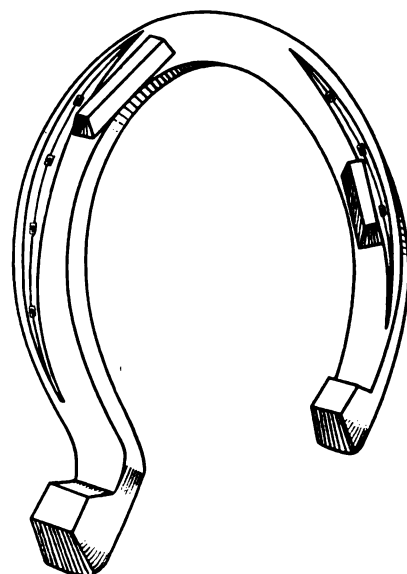
Well, the subject of my article is of this brand, and I just let it pass at that. In a more recent article, the writer referred to, took a fall out of all horseshoers generally and stated that from his "extensive experience" "he had arrived at the conclusion" that the horseshoers were directly to blame for ruining fully fifty per cent. of the horses of this country while they were in the prime of their lives, and that ninety per cent. of them (the horseshoers) were an uneducated lot of men who treated a horse's foot just as a mason would a block of stone, and that they were incapable of dressing a foot and doing it right. He also lays great stress on what is a serious handicap to his "extensive practice" and that is his difficulty to find men who are capable of paring out and dressing a foot for him. Just think, brothers, of this "eminent vet's" opinion of all of us! It's enough to make our departed exponent of the art, William Russell, turn in his grave.

I wonder if this man could dress a foot himself. It's dollars to doughnuts that he cannot, and I want to state right here that if he can do so, neither can he tell any practical man how to do so; and furthermore, he would not know if it were done right or not.

He invariably writes the same old stuff,—"Don't cut the sole; "Don't cut the frog; "Don't cut the bars if you value your horse's life," and "Above all, don't let your rasp come in contact with the wall or outside of the hoof." Now this is certainly valuable information I must confess, and I really would feel surprised to think that any of you would use a knife or a rasp at all. But at that I guess it would be a shame to bet that this same "anti-cut" advocate does not do anything like that; O, no, he just has a man cut for him, and then cut some more; and when does he know that he has cut enough? Why, we have probably all done work for one or the other of these "wise vets", and we all know just when he stops cutting. He, kind

reader, has the truest sign in the world that tells him when he is in danger. That sign is nothing more than just plain old fashioned blood,—red blood. We hardly ever trim a foot for one of those wise ones that we do not run into some sort of a blood vessel. I remember one old "vet" whom I had the pleasure to assist for several years. After running into the customary gore on every foot that I ever dressed for him, he would invariably remark: "That's nothing, young man, only a small vein or artery that was nearer to the surface than it ought to be, you know nature is not always perfect." By the time I got through cutting feet for him I had very little faith in the handiwork of nature.

Here's the outline of a case I ran into last fall—it is similar to the above; this case had been in the care of a whole school full of "vets" and students about to be turned loose onto the unsuspecting horsemen. After getting back from the races last fall a prominent horse owner told me of a young mare that he had at the Veterinary College Hospital. This mare was lame behind and although she had been there over a



TYPE OF SHOE WORN BY ANIMAL DESCRIBED BY DR. SEITER

month she had baffled all diagnosis and treatment, and was getting worse instead of showing any signs of improvement, in fact, she was receiving no treatment for the simple reason that they had found nothing to treat.

The owner stated that she would start out very lame for a few yards, then gradually "warm out of it" and go apparently sound. She had a record of 2:17 and 2:10 speed and was a valuable racing proposition



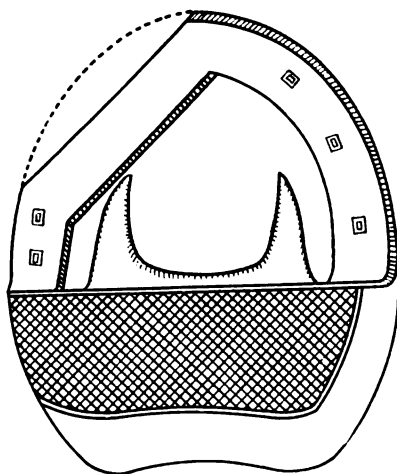
provided she would stay sound enough to stand the severe training that a race horse is supposed to stand. Of course, this was out of the question as long as she betrayed the least symptom of lameness.

The college she was kept at being my Alma Mater, I naturally hesitated a bit, for it seemed to me I was still a student, and how dared I cross that threshold of learning and attempt to unravel a mysterious case of lameness that had baffled the whole faculty, the grim and mysterious old professors (who had me in charge, and taught the young idea how to cut). But I finally mustered up sufficient courage, and looked her over. She was a rather trim built mare, stood about 15-1, weighed about 900 lbs., and was of excellent conformation and if she had a pimple anywhere that would give one a clue to her lameness, I failed to see it after making a thorough inspection. There was no soreness or fever at the seat of the spavin, or rather where we would naturally look for a spavin, but still she was very lame for a few steps. On picking up a front foot I noticed that it was very dry, hard and contracted, with considerable excessive, or superfluous growth at the toe, although it was naturally an excellent type of foot. On inquiry I found that the mare had been in the hospital for seven weeks and had been shod for some time previous to her admittance. Her shoes should, of course, have been removed immediately and her feet dressed down on entrance to hospital. The assistant "vet" who had charge of the hospital told me that they had overlooked her feet altogether, (although it was preached into the students' heads every day, that if you lay an animal up for even a few days, be sure that the shoes are pulled off and the feet taken care of).

He also stated that he had her hind toes taken down a few days ago, and had her shod; her toes looked mighty long to me and I told him so, but he said he was there when she was shod, and furthermore he knew his business or else he would not beholding such a responsible situation. I found out, afterward, that he had only "guessed" and that instead of having her toes taken off and slightly lowering the inside of the toe, as is customary where we shoe for a spavin or suspected spavin lameness, he had paid too much attention to the inside heel and quarter, and when it was cut to the "quick" he had simply stopped and nailed the shoe back onto the

long-toed foot again.

About two weeks after this she came to me with her toes four and one-half inches long. On her feet she had a pair of shoes that were "works of art". It was a number three, iron, machine-made shoe, outside heel very long and "muled" out well and about a five-eighth inch calk turned upon it. The inside heel was far too short and turned under so that most of the bearing was directly on the sole. About the middle of the inside quarter there was a small side calk, and at the outside toe there was quite a fair-sided calk to tip the foot in. This thick shoe and the two calks combined certainly put quite a foot on this little mare, and it was a wonder to me that she could walk at all. It actually seemed as though she gave vent to a long drawn-out sigh of relief when I pulled off her shoes and



THE SHOE AND PAD USED TO REPLACE THE HEAVY SHOE

with a pair of hoof nippers took over three-quarters of an inch right off of the toe. Mind you, this was only two weeks after "Mr. Vet" had taken her foot down all it would stand. I left most of the heel and simply lowered the toe a trifle toward the inside, to relieve the tension upon the tendon as it passes over the seat of the spavin.

The shoe I then made for her was more or less of an experiment with me—that is, the theory looked good, but I had never given it a practical test. I shod her with a medium rubber pad, same as used on light carriage horses. This gave me a good high heel to relieve the strain on the tendons and ligaments, and also to take the concussion off of the hock joint. To hold the pad in place I made a "tip" out of $\frac{1}{4}$ by $\frac{3}{4}$ -inch toe calk steel and put it across the inside toe, the same as we fit a shoe for a cross-firing pacer. This also

helped to keep the pressure off the inside tension.

After shoeing this mare with this combination she was taken right out and jogged and although she raced on the ice all winter and is now away to the races she has never taken a lame step from the day she left the shop.

If you have a case of spavin lameness or suspect spavin lameness, give this a trial, as I certainly believe this is the proper dope for this ailment. I have had good success on several large drafters who were supposed to be beyond redemption as far as a cure was concerned, but it certainly relieved them when their toes were cut off and a good, thick heeled pad applied, to relieve the strain and at the same time to reduce the concussion to a minimum,—something a high-heeled shoe fails to do.

I have seen work horses who just barely let their heels come in contact with the pavement—it mattered not how high they were—and when a rubber pad was applied and a tip without a toe calk they did rest their heels and would gradually learn to work flat footed again, instead of walking upon their toes alone. This alone satisfied me that it was not the strain alone that they feared, but the concussion also. Shod this way you give height to relieve the tendons and ligaments, and the rubber cushion to relieve the concussion to which the bony column is subjected.

The theory is O. K. but it must be borne in mind that no shoe can be a success unless we dress the foot accordingly. In this case, as shown in Fig. 1, the shoe worn by this mare contained too much iron and was too clumsy for this style of animal anyway. The rubber pad and tip is plain and I believe its virtue will not be difficult to comprehend.

This article is written in friendly criticism to show that no one knows it all, and that the best of us are apt to overlook some small trifle that may keep us from success.

Judging Draft Horses—5

A. S. ALEXANDER
Common Unsoundnesses

Having learned how to judge the various parts of the horse's exterior, as regards correctness of form, the student should next acquire a fair degree of skill in detecting the more common and serious unsoundnesses. The instructor should describe and show the location of each and, when possible, demonstrate from affected animals. Where possible a graduate



veterinarian should be employed to give such instruction. The diseases and unsoundness should be studied with reference to the parts involved.

Head.—Poll evil is an enlargement of the poll, containing or discharging of pus, due to bruise, not hereditary, a serious unsoundness, and often difficult to cure. A recovered case may leave the neck permanently stiff. Look for scars.

Eyes.—Test for blindness. Pupil of the eye should contract in the



THE GENERAL OHIO SHOP OF MR. JOHN REISINGER

light. In blindness from paralysis of the optic nerve and retina (amaurosis, or "glass eye") the pupils are widely dilated and cannot contract. Cloudiness or opacity denotes "moon blindness" (periodic ophthalmia) or cataract. Suspect periodic ophthalmia if one eye appears smaller than the other, or is retracted into the orbit, or if the upper eyelids are angular and wrinkled. Specks may be due to injuries and are unimportant if the sight is not impaired thereby.

Ears.—Excessive motion of the ears may indicate impaired vision, viciousness, or nervousness. Lack of mobility may indicate deafness, or tetanus (lock jaw). The base of the ear is sometimes the seat of troublesome discharging fistula.

Muzzle.—The nostrils should be free from the discharge of chronic catarrh or glanders. They are sometimes plugged with a sponge to hide "roaring". The lining membrane should be healthy pink in color; free from ulcers, purple spots, or bad-smelling discharge. The lips should not be torn; free from chronic sores from bit at angle of mouth; lower lip not paralyzed and drooping uncontrolled.

Teeth.—Examine for diseased, missing, or projecting molars; overlapping incisors ("porrot mouth"); "bishopping" (artificial marking of the incisor teeth to alter indications of age) and undershot jaw. "Wolf" teeth are vestigial anterior premolars of the prehistoric horse, without ma-

terial importance and never the cause of weakness or disease of the eyes. They are located in front of the first premolar tooth in each upper jaw.

Tongue.—See that the tongue is intact and healthy. Part of it may be missing or mutilated. See that the floor of mouth is sound where the bit rests.

Underjaw.—Look for discharging, or plugged fistula of salivary duct or one connecting with a molar-tooth root or diseased bone due to injury by the bit, abscesses, and tumors.

Neck.—Broken crest in stallions, sores, skin disease, and artificially "braided in" manes should be noted.

Withers.—Fistula of the withers, acute, chronic, or healed; and collar sores are found on the withers.

Shoulder.—Collar boils, fibroid tumors from bruising, "sweeney", and fistula or abscess injure the shoulders.

Elbow.—Shoe boil may result from bruising the point of the elbow.

Knee.—Scars from "broken knee", due to falling, puffs, "buck knee" (bent forward), "calf knee" (bent backward), high splint, capped knee.

Cannons.—Splints are abnormal bony growths (excrecences) formed at the sides of the cannon bones where the small splint bones (metacarpals in front, metatarsals on hind leg), overlie the large cannon bones. They are objectionable, may cause lameness when forming, are often an indication of light bone, but ordinarily should not be deemed to constitute hereditary unsoundness. If found on all legs, of large size, and associated with other bony growths (exostoses), they may indicate a hereditary tendency to such bony growths (bony diathesis), and the animal should be rejected for breeding purposes. Examine back tendons for thickening or "bowed" condition. In examining horses having hairy legs search for evidences of grease and grease heel, such as old scars, fissures, grapelike growths or discharge having bad odor, and for "scratches".

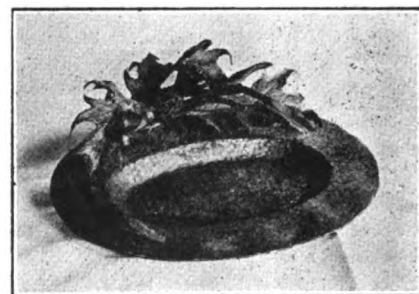
Fetlocks.—Puffs, (wind galls) interfering sores, "knucklin", or "cocked" ankles, grease, grease heel, and scratches have their start in the fetlocks. Examine the skin just above or below the fetlock joints for scars of "unnerving" (neurotomy).

Pasterns.—The seat of ringbone, a serious, hereditary unsoundness is the pastern. These bony growths, found on the upper, middle, or lower portions of the pastern bones, may

partially or wholly encircle the bone, and in aggravated cases, cause lameness and involve and interfere with the proper action of the fetlock joint, above or with the coffin joint at the lower end of the pastern bone. They give a bulging appearance to the part of the bone affected, have the feel of bone and constitute unsoundnesses. In work horses ringbone involving a fore pastern is much more serious than ringbone on the hind pastern.

Cornets or Hoof heads.—Sidebones are located under the skin of the coronet of the fore feet (occasionally the hind feet), at the quarters. They are due to the lateral cartilages at these parts changing to bone. When present they may be detected as prominent, hard, bony masses protruding above the hoof at the sides of the feet towards the heels and bulging the hoof under the part involved. When sidebones are absent the cartilages can be grasped between the fingers and thumb and moved or bent from side to side as if they were formed of stout rubber. Sidebones are common in draft horses and constitute unsoundness. Horses having wide, flat, low heeled hoofs are most subject to this unsoundness. Horses afflicted with sidebones or ringbones should not be used for breeding purposes. Quittor, a fistulous abscess, is also a common unsoundness of the coronet.

Feet.—Navicular disease causes hardening and contraction of the



MR. CRAN'S FAVORITE, THE THISTLE

hoof and chronic lameness. The affected horse "points" his lame foot forward when standing at rest, starts off lame and "warms out of" the lameness. The tendency to the disease is deemed hereditary. It constitutes a grave unsoundness for all purposes. Other common unsoundnesses to be looked for are "founder", indicated by rings and ridges on the hoof wall, abnormal projection at the toe, convexity at the sole ("dropped sole"), and lameness; sand crack in wall at front of toe; quarter crack in wall at quarter; corns, in the sole at the angle of bar



and heel; and thrush, a diseased condition of the frog characterized by a bad-smelling discharge from its cleft.

Hips.—Examine for fractures of the point or shaft of the hip (ilium) indicated by distortion, on comparing one hip with the other from the rear; also examine for similar distortion on haunch at side of tail (from fracture of the tuberosity of the ischium).

Tail.—The black skin of the under side of the tail and nearby parts often is the seat of melanotic or "pigment" tumors in aging white or grey horses. The disease is incurable and constitutes unsoundness in both work and breeding horses. Examine end of tail for diseased or unhealed conditions due to docking and see the tail is not artificial and "joined on".

Strifle.—Should be free from dense or dropsical swelling and the knee cap (patella) should remain firmly in place during motion.

Hocks.—The hock joints should be free from bone spavin, bog spavin, thoroughpin, curb and evidences of "firing". Each of the diseases mentioned constitutes an unsoundness in both work and breeding animals; tendency to them is considered hereditary. Bone spavin is a bony growth upon the surface or among the small bones, on the inner, lower part of the hock joint, or may involve the true joint higher up. A bony growth appearing upon the outer part of the point is called a "jarde". In spavin lameness the horse starts out lame and improves or recovers with exercise. Bog, or so-called "blood" spavins, are soft, fluctuating distensions, of the capsular ligaments (synovial or joint oil sacs) of the hock joints, and give a bulging appearance to the front of the part involved. Curb appears as a bulging, calloused enlargement upon the rear portion of the hind leg, just under the hock joint, involving the tendons and ligaments and sometimes the bone of the part. Crooked or sickle hocks are most prone to curb, which follows undue strain when at play or work. Actual unsoundness, implicating the hock joint and objectionable conformation, rendering the joint liable to contract disease or become unsound, should be carefully avoided in the selection of breeding stock and work animals.

Other Unsoundnesses

Chorea, shivering, or St. Vitus' dance is considered a hereditary disease and also constitutes unsoundness in work horses. It is commonest in nervous, tall, narrow animals. The

disease is most readily detected when the horse is made to move from one side to the other, or back out of the stall. The leg is jerked up once or twice at these times and the tail and muscles of flank quiver momentarily. The symptoms disappear when the horse is exercised. Stringhalt (akin to chorea), is the term applied to the continuous exaggerated jerking up action of a hind leg seen in some horses. The trouble in some instances is remediable by operation (personal tenotomy).

Roaring or laryngeal hemiplegia.—Roaring is characterized by noisy breathing when the horse is exercised. It constitutes unsoundness in both work and breeding horses.

Heaves or emphysema of the lungs.—Heaves is indicated by double bellows-like action of the abdominal muscles as the horse breathes and a cough also is present. Like roaring it is an unsoundness of the breeding animal and work horse.

Vices such as cribbing, windsucking, and weaving are best discovered when the horse is in the stall and although not certainly hereditary are highly objectionable and detrimental unsoundnesses.

Welding Without Hammering—Part II.

M. KEITH DUNHAM,
Oxy-acetylene Engineer.
Size of Torch Tip

The choice of the size of welding tip must come as a matter of experience. If the tip is too large, you will have difficulty to prevent breaking through—that is making a hole. If too small, the metal will not melt properly. Tables showing which tip to use on a certain thickness are practically useless, since we have already learned that much depends upon whether the article is preheated, if a heavy section joins, etc. If a hole is made or if there is some difficulty in filling a depression, owing to the force of the flame and the tendency of the weld to drop or collapse, learn to do "surface welding". Hold your torch as in Figure 17, with the flame just striking the top of the article being welded. Be very certain, however, that fusion takes place continuously as it is very easy in this instance to allow hot metal from the welding rod to drop onto comparatively cold metal on the article welded. This method will also be found advantageous in building teeth on gear wheels.

Machining

You may have followed all these directions and found your weld too

hard to machine. Where is the trouble? Either in the welding rod used or the flux, probably the former.

Cast iron gets harder each time it is melted. The foundry making soft castings uses but little scrap and plenty of pig, while the foundry which makes castings that do not have to be machined or subjected

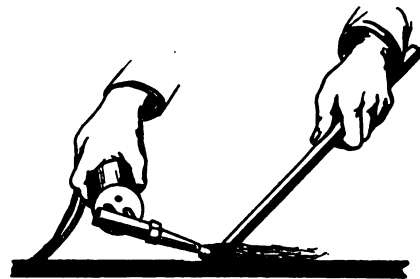


FIG. 17.—HOLD THE TORCH SO THE FLAME JUST STRIKES THE ARTICLE

to strain, can use practically all scrap. Oxy-acetylene welding is simply a re-casting but it is applied locally, so that each time a weld is made, the weld is harder than the original metal if no provisions are made to offset it. We have already learned that slow cooling will prevent hard or chilled iron. Likewise, we must have a welding rod of better quality than the casting to offset the recasting hardness which will take place. The element necessary to soft cast iron is silicon—so that the welding rod should have from three to four per cent. silicon, be absolutely free from sand and con-

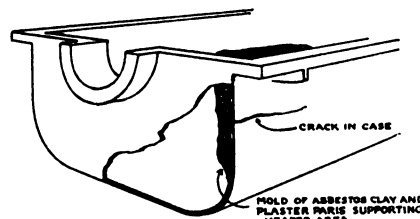


FIG. 18.—THE BREAK IS BACKED UP WITH A MOLD

tain as little as possible of manganese, which is detrimental to the weld. This rod must be made by a foundry understanding these conditions, and a large part of the trouble of unsuccessful welds may be traced to the welding rod made without this knowledge. Be certain then that your welding rod is purchased under the specifications given. Such a rod will cost from eight to twelve cents a pound, depending upon the quantity, and it is the poorest economy to lessen the quality of this rod by having it cast at a local foundry, using scrap, at a saving of a few cents.

The duty of the flux is to remove



the dirt, sand, etc., and to prevent or offset certain detrimental chemical actions. With no knowledge of these chemical actions, it is very possible to use a flux, while apparently helping to fuse the metal will harden the weld. Borax is many times used but its effect is not the best,

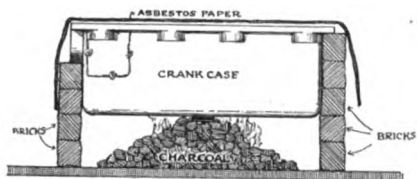


FIG. 19.—CHARCOAL IS USED TO PREHEAT ALUMINUM

especially in finishing the surface of the weld. Salt tends to harden. Equal proportions of carbonate of soda and bicarbonate of soda will be found desirable, if the flux employed is unsatisfactory.

In the welding of any metal, each point is important. Particularly is this true with cast iron and if any phase is overlooked through carelessness or lack of knowledge, its results will generally appear in the weld. If these suggestions are carefully read and followed, however, welding will be found easy to master; the welds will be soft and easy to machine, and the contraction problem not a matter of "hard luck" because guesswork is eliminated and the contraction planned for and overcome.

Aluminum

One of the hardest metals to handle for the inexperienced welder and yet one which with the proper materials is comparatively easy, is aluminum.

The blacksmith may be called upon any time to repair an automobile engine where the connecting rod has broken, smashed the top of the cylinder and then torn a section out of the upper half of the aluminum crank case and finished up by punching a hole in the lower half. It is quite possible in a job of this character for the operator to get enough profit to pay for the entire cost of his welding outfit.

The aluminum castings used in automobile construction will vary in their composition. Practically all of them have at least 80% aluminum, some have as high as 93%, the other metals being copper and zinc. If they contain more than 20% zinc (rarely the case), the casting is practically impossible for the ordinary welder to handle, owing to the fact that the zinc, having a low melting point, will be destroyed and

burn away in the form of a gas, before the aluminum melts.

Now, aluminum when melted has a high affinity for oxygen—that is the air attacks the surface and forms another metal known as aluminum oxide, and it is this oxide which makes the welding difficult. Again, aluminum conducts heat very rapidly,—about three times as great as iron—so that the heated area of a case being welded is large—therefore expansion is considerable and the casting easily warped or contraction cracks plentiful, unless the proper care is used to overcome or offset this expansion.

Some authorities recommend the "puddle" system of welding, that is, using a small iron stick or paddle to break the oxide and "pat" the weld together, but his method has two disadvantages—it leaves the oxide in the weld and it requires considerable skill and practice. Using a flux to break this oxide makes a stronger weld and considerably simplifies the work. The duty of this flux is to offset the action of the air on the molten aluminum and

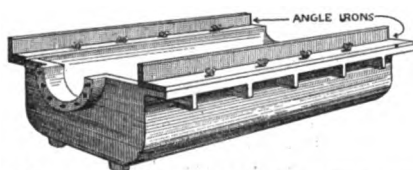


FIG. 20.—ANGLE IRON BRACES ARE USED TO HOLD BEARINGS IN LINE

to allow the joint to flow together. Unfortunately, it has been the practice of some supply houses to furnish for this purpose cheap chemicals which are absolutely useless. Here are two formulas for those users who have been unable to secure the proper fluxes. Either combination is good, the only requirement being that the powders be absolutely dry and finely ground.

No. 1.

	By Weight
Potassium Chloride	6
Lithium Chloride	3
Kryolite	1

No. 2.

	By Weight
Potassium Chloride	4
Sodium Chloride	3
Lithium Chloride	1½
Potassium fluoride	1
Bisulphate of Potassium.....	½

The welding rod should be as near as possible the same percentage as the casting, but inasmuch as it would be impractical for the blacksmith to carry in stock more than one composition, the formula for the rod should be about 88 aluminum, 10 zinc and 2 copper, and to avoid dirt, oxide, etc., should be made of pig

aluminum. The drawn rod or wire of pure aluminum should not be used on a casting owing to its higher melting point and its ductility and therefore its liability to bend too easily in the weld.

Since aluminum conducts heat at a very rapid rate and at the same time has a low melting temperature, two points must be observed—the size of the welding tip should be nearly the same as for cast iron of the same thickness; and second, great care must be used to keep the heated area from collapsing, since aluminum loses its "strength" when heated above 800 F.

To overcome this, the beginner will find it necessary to *back up the weld and the heated area* with a mold as in Figure 18. A cheap mixture for this is 2-3 asbestos clay and 1-3 plaster of paris, well dampened and firmly patted to the case. Make it about ½ to ¾-inch thick and if these ingredients are not handy, construct the mold out of anything that will cling to the case and withstand the heat. Asbestos paper may be used, backed up by fire brick and clay.

This mold should be allowed to dry before welding is started, as a wet mold will make welding very difficult.

We have already learned (in cast iron welding) that to offset the strains set up by welding, we must preheat the casting. Then, following the same instructions as on iron castings, we strip the case, being careful to get out the bearings, shafts, etc. Study how the weld is going to be made and arrange the case for preheating so that it will be necessary to handle it as few times as possible. Use charcoal to preheat, being very careful not to bank in the case with coals, as may be done with iron castings, but arrange as in Figure 19 the coals under the case and then cover over

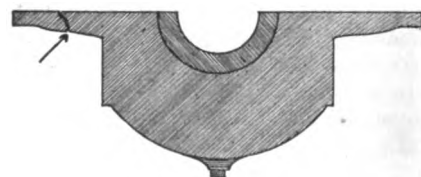


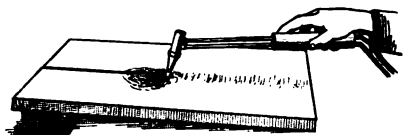
FIG. 21.—PREHEATING IS UNNECESSARY WHEN THE PART CAN EXPAND FREELY

with asbestos paper to retain the heat. Heat *slowly*, remembering that it takes some time to thoroughly heat aluminum, but likewise that it melts at a low temperature. When it gives off a dull sound if tapped lightly with a hammer, it is ready to weld.



Use a neutral welding flame the same as for other metals. Heat the welding rod slightly and dip in the flux can and then play the flame on the break, holding the end of the blue cone about the same distance from the metal as in cast iron welding.

When the metal starts to melt, it does so rather suddenly, there being no warning as in the case of cast iron by the metal getting red and then brighter till the welding heat is reached. Aluminum looks about the same ready to melt as it does cold, but it will be observed that when it is ready to melt, there is a wrinkled appearance,—the comparison easiest understood would be the skin of a very old person, except in this instance the color is a dull gray. At the time the metal reaches this condition the edges of the break draw away from each other. Now dip the welding rod, with the flux on it, directly into this spot and melt a portion of it with a circular,



FIGS. 22 AND 23.—EASY WAYS FOR THE BEGINNER TO LEARN THE USE OF THE TORCH

finishing with an upward motion, the last carrying the heat of the torch away from that immediate section. Follow this general plan until the weld is completed.

It should not discourage the smith if the crank case has several pieces missing, as with the aid of his "backing up mold" he may break up pieces of a case secured as junk and by "tacking" these together form almost any shape roughly and then weld and finish.

If the break runs through a bearing or on a machined surface, these pieces may be "lined up" by the use of shafts or angle iron as in Figure 20, and the pieces then tacked together. Some manufacturers instruct their users to preheat with these angle iron and shafts in the case, the contention being that these will prevent warping. This is very poor advice, however, as these pieces prevent the proper expansion of the case which you are trying to secure by preheating and their weight is

likely to collapse the case when it is sufficiently hot. If used at all, they should never remain attached to the case while preheating.

Of course, where a lug or an arm is cracked or broken (Figure 21), and there is an opportunity for expansion to take place naturally, preheating is unnecessary, as we have already learned in the welding of iron castings.

When the case is cold, the weld should be thoroughly washed in running water, using a wire brush to remove all traces of the flux. Failure to do this may later affect the strength of the metal.

In finishing, first use a cold chisel and bring to a surface with a vixen file or a rasp. The ordinary file cannot be used and the emery wheel or grinder is useless.

Beware of aluminum solder. It melts at a low temperature and the use of it is more or less of a temptation, since it is simple to apply. Remember that when aluminum is cast, the surface has a film of aluminum oxide and that this oxide prevents any real bond being made, unless it is destroyed, which happens only when it is melted. Solder should never be used where strength is a factor.

Copper, Brass and Bronze

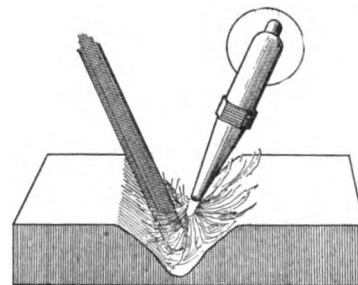
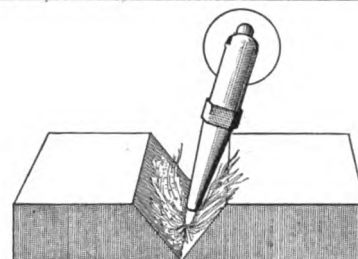
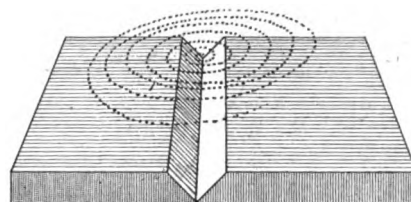
Copper in a pure state is very difficult to weld and maintain its ductility. The blacksmith would very rarely be called upon to weld this metal and a brazing job would probably meet every requirement. Use ordinary borax for a flux and for a filler rod, soft brass wire or tobin bronze. Heat the metal *nearly* to the melting point and keep the flame away from the copper a distance of one-half an inch to one inch while the filler rod is being added. Because of the high conductivity of this metal, a tip considerably larger than that used for cast iron of the same thickness will be necessary.

Brass and bronze casting are compositions of copper and tin or copper, tin and zinc in varying proportions. If the metal is yellow, it percentage of copper is low and the zinc high. If red in color, there is a high percentage of copper and low of zinc and tin. Obviously, the melting points are different and a true weld would be impossible unless each casting were analyzed.

Fortunately, for repair purposes we are able to make a strong bond by the use of tobin bronze as a feeding-in rod and equal proportions of borax and boracic acid as a flux. The use of a welding rod containing a small proportion of phosphor is

also advantageous in the case of castings high in copper.

It is desirable to prepare these metals by grooving out the weld, as in iron castings and to preheat them if large, or if there is a strain set up by welding. The flame should be held a longer distance from the weld than in the case of other metals and the weld made much the same as with aluminum,—by *quickly* fusing the welding rod to the molten metal and immediately removing the flame from that particular point, to prevent the metal from collapsing.



FIGS. 24, 25 AND 26.—HOW THE FLAME IS MANIPULATED TO MAKE THE WELD

Extreme care must be used in setting up the work so that there will be no strain on any portion around the weld, as brass or bronze castings have practically no "strength" when hot and collapse easily.

Blow holes in the weld are caused by burning out the zinc, which will be noticed by the deposit of a yellow powder. This is caused by holding the flame too long in the same spot or by bringing it in too close contact with the metal.

Malleable Iron

This metal is neither cast iron or steel, yet verges from one to the other and may be in sections either the one or the other. To understand the treatment of it better, one should realize that when cast it is a white, brittle, very hard cast iron



and that by continued heat treatment, a *chemical* change takes place which makes the metal ductile. How deep into the casting this ductility may extend depends upon the thickness of the metal and the length of

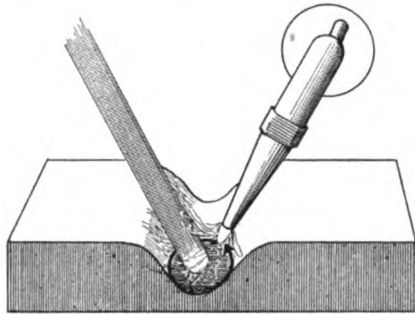


FIG. 27.—THE CIRCULAR MOVEMENT IS CONTINUED

time the heat treatment is kept up. A malleable casting, therefore, may be steel on the surface, a semi-steel in the centre and hard cast iron at the core. To successfully weld it is impossible, since cast iron used as a filler rod would not perfectly unite all the way through and steel would offer the same disadvantage. Moreover, when the edge of the break is melted, it becomes very hard and brittle. Attempts to drill or finish a malleable casting, welded with cast iron or steel, usually result in the breaking of the drill before it even starts in the material, and if such a job leaves the shop, the chances are 100 to 1 that it breaks in service. How then, repair it? By brazing, of course. Clean it thoroughly and V out the same as for any other casting. Bring it up to the red heat with the welding torch, use borax as a flux and tobin bronze as a filler rod, being careful not to burn the zinc out of the welding rod by bringing the rod in close contact with the welding flame. *And be careful not to melt the sides of the break*, since this will result in hard spots.

Build up by adding the bronze on top of and on each side of the break generously, depending, of course, on the use to which the casting is to be put. If great strength is desired and the original casting poorly designed to meet the strain, wrought iron straps may be laid crossways of the weld and these joined to the casting by the tobin bronze.

Steel

Telling a blacksmith how to weld steel sounds a good deal like carrying coals to Newcastle, yet *because* of this knowledge, he is likely to view with disdain instructions on oxy-acetylene welding and his trials

be many in applying his blacksmith experience to the new way.

Is a steel weld strong by this method? Yes, *properly executed*, with good apparatus and materials, it can be better than 90%. *Improperly executed*, it can be such that the weld can be almost picked apart with the fingers.

Steel welding, to be right, requires perfect conditions — *pure gases* (therefore if the generator is improperly designed you start in trouble), *an absolutely neutral welding flame*, the *right welding rod and practice*; and the last is by no means the least important.

You know that in heating wrought iron or mild steel in the forge, you watch carefully the heat and just at the moment it begins to spark, *out it comes*. If it stays longer, you burn it. This "burn" is the oxygen of the air using the metal as a fuel, and you know that if you weld "burnt" metal, the weld isn't a

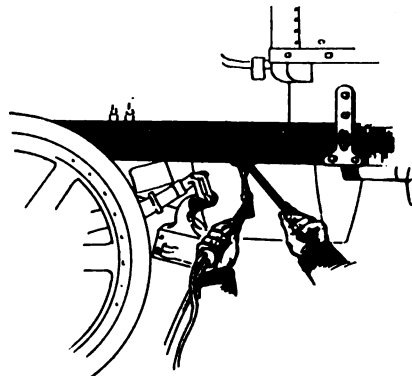


FIG. 28.—IT IS SOMETIMES NECESSARY TO DO OVERHEAD WELDING

good one because it has lost its life and become brittle.

So that you should especially remember that in the welding torch, you are using pure oxygen and if this oxygen comes into contact with your weld, the metal is oxidized or burnt and the weld weak. *Adjust your flame carefully at the start of the weld and watch it during the weld.*

Particular emphasis is laid upon this point, since it is the most often neglected. Remember that the oxy-acetylene flame can give you three *kinds* of heat, *oxidizing*—too much oxygen, *carbonizing*, too much acetylene (or too little oxygen) and *neutral*—just right.

Remember that all welds are butt welds and for pieces over 1-16-inch thick, the metal should be channeled or grooved out. Ordinarily, it isn't practical to preheat steel welds, because of their shape (an automobile frame, for instance), but

wherever it is possible, by all means do so, as the results are always better.

Certain claims are sometimes made regarding the position in which to hold the torch in relation to the line of welding. Theoretically, and undoubtedly, the best way for experienced welders, is as illustrated in Figure 22.

The beginner, however, may find it advantageous to start as in Figure 23. By inclining the weld somewhat (welding up-hill) there is less tendency to flow the filler rod on cold metal, as there would be in Fig. 22. Now for the weld.

Hold the torch so that the end of the blue cone is about half an inch away from the weld. *Very slowly* move the torch in a gradually decreasing circle, as in Figure 24, until the weld *and a distance each side about three times as wide as the metal is thick, becomes red*. The failure of the beginner to do this is usually caused by his anxiety to see the metal melt by plunging the blue cone directly on the weld. The metal surrounding the weld must absorb a certain amount of heat before fusion starts, to avoid burning.

Now bring the end of the blue cone down so that it just "licks" the article being welded, as in Figure 25. When this starts to melt, bring the welding rod in *contact* with the weld and by partially directing the flame on the welding rod, as in Figure 26, a portion of it is melted. Fuse this to the metal by one complete circular movement around the edges of this material, as in Figure 27 and begin again on a spot immediately adjoining. You must simply bear in mind strongly that you are welding without hammering by *fusion* only and that your flame must come in contact with every bit of material to fuse it properly.

If the tip is too large, it will be evidenced by this metal becoming

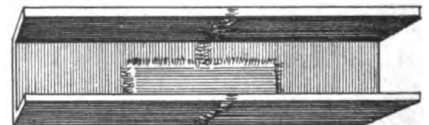


FIG. 29.—CHANNELS ARE SOMETIMES REINFORCED ON THE INSIDE

frothy and an excess of sparks; if too small, the metal is hard to melt.

The welding rod should be of practically the same material as you are welding, except that it should be as pure as possible. Norway iron, in the form of a small rod or wire,



will be found all right for mild steel welding, but be careful that both it and the weld are free from rust, since rust is oxidized metal and its incorporation in the weld means brittleness. No flux is necessary.

The thickness of this rod should be about the same as the thickness of the metal being welded, but a 3-16-inch size will be found desirable for the work around a blacksmith shop. Do not use wire twisted together; your blacksmith experience will tell you that *too big* a flame or *too much heat* will burn steel and a flame might be just right for the thickness of the metal and too much for a small wire. For the same reason, keep the welding rod in contact with the article being welded when you melt it so that the metal will conduct the heat to avoid burning.

Unlike other metals, steel may be easily welded in a vertical position and with some practice, overhead as well. Steel solidifies almost instantly the flame is removed, and vertical and overhead welding is only a matter of a little practice, once you master the principle of ordinary welding.

In welding an automobile chassis for instance, it is sometimes necessary to do overhead welding as in Figure 28 and always it is essential to do vertical welding. The beginner should not solely depend on the weld for strength in a repair of this character, however, and should reinforce with a strap on the inside as shown in Figure 29.

Crankshaft welding is perfectly practical, except in the rare cases where a chrome nickel steel is used. If you weld a crankshaft, remember the effect of expansion and contraction, and do not depend upon V-blocks or a face plate to keep from warping, since the power of expansion, we have already learned, cannot be overcome by clamping. If you accept a crankshaft to weld, do so with the understanding that it must be trued up after welding.

Steels of high carbon, that is tool steel, tempered steel, etc., offer difficulties to great to be attempted by the beginner and require explanations which would not be a part of elementary instructions. It is sufficient here to state that if you must weld steel of this character, you must plan on burning out considerable carbon, that the flame should not be kept on one spot too long and that the flux, formula of which was given for cast iron welding, will be found helpful.

As you progress in the mastering

of the principles given in these articles, practical ideas of overcoming difficulties will suggest themselves, but it is not good policy to experiment on your customer's job—you'll probably lose the customer. Just take the author's word for it, these *principles* are correct—and they were learned at the cost of thousands of dollars, considerable sweat and a number of years' experience. They are yours for the reading.



Benton's Recipe Book

In these days of oxy-acetylene welding, and cutting and the discussion of various means, methods and processes of making and using this comparatively new tool in the smith shop, it may be of interest to some readers to reprint a little note regarding the generation of oxygen that recently appeared in a foreign exchange. This is not suggested as a means of generating oxygen for the oxy-acetylene torch as this method will we believe to be somewhat expensive, it may, however, contain a suggestion for those readers who have self-generating machines.

"This method of generating oxygen was patented by Dr. J. Harger. In this process a mixture of 500 parts of potassium chlorate, 62 parts of manganese dioxide (finely divided as in Weldon mud from chlorine manufacture), or ferric oxide and 4 parts of lampblack are mixed together and passed through a very fine sieve. The material is then damped, put into a mould, and submitted to considerable pressure, so as to form a stick or cylinder about 1 in. in diameter. It is dried and then tipped with a match-head or ignition material. It is ignited at this end and then dropped into a metal cylinder, which is closed with a lid and provided with a tube at the top. The cylinder smoulders until all the oxygen is given off. There is a little carbonic acid in the gas, and this is removed by passing it through a box or purification chamber charged with pine shavings saturated with a strong solution of caustic soda. The gas is then cooled and passed to the helmet for breathing purposes. The object aimed at is the ready generation of oxygen for use in rescuing life after coal-pit explosions, or for use during fires; but the oxygen could be employed for any desired purpose.

To paint concrete treat the surface with a solution of zinc sulphate and water (equal parts by weight). The liquid may be applied with an ordinary bristle brush after the concrete is dry. This should be allowed to dry for from two to four days when the paint can be applied in the ordinary way.

Blackboards, in reply to "School Board", may be made by using the following coat-

ing: Dissolve one pound of shellac in one gallon methylated spirit and then add 5 ounces of the very finest emery flour, 4 ounces of ultramarine blue and 8 ounces of ivory black. Mix very thoroughly and then pour into a tightly corked bottle as soon as possible as the mixture hardens quickly. When ready to cover the board, which, of course, has been smoothed and finished as carefully as possible, lay the board flat. Then shake your bottled mixture thoroughly, pour a quantity out and proceed to apply it quickly with a good flat varnish-brush. When thoroughly dry, the surface should be rubbed smooth. If not properly surfaced, sandpaper and apply a second coat.

A new one to me at least is the following for drilling cast iron. I came across it just the other day, but haven't yet had a chance to test it. I'll pass it on to you with the suggestion that you try it the next time you have a job of cast iron to drill. The hint is simply to use carbolic acid in drilling. Kindly let me know how it works out. I presume full strength acid is meant.

To weld steel to iron, says an English reader, take 50 parts of clean iron filings, 5 parts of sal ammoniac, 3 parts of borax, and 2 parts balsam of copiba and mix the compound thoroughly. Now heat the steel to a red, clean off all scale and spread with the compound. The iron, in the meantime, is heated to a white heat and the pieces are then welded in the ordinary manner.



Queries— Answers— Notes

Half and half for aluminum soldering.—As a reader of THE AMERICAN BLACKSMITH I would like to know of a good way to solder aluminum with the regular half and half solder. Will be pleased to hear from you in the journal.

J. D. BRUINE, Illinois.

In reply.—If it is possible to do what this reader suggests by his question I have yet to hear of it. Certainly there wouldn't be so much striving after special fluxes and special aluminum solders if the ordinary half and half were useable. Workers in aluminum have experimented on this problem and from them come the many aluminum solders and fluxes that appear from time to time. Several of these have appeared in the columns of "Our Journal".

H. F. S., New York.

Lard oil making.—Please tell me through your columns how to make lard oil.

JOSEPH M. DECKER, New Jersey.

In reply.—Lard oil is just what its name implies—oil of lard. It is not as many suppose melted lard. The method of extracting or expressing the oil from lard is to first chill the lard until it forms into

somewhat of a crystalline form. It is then placed in a press where the oil is pressed out of it. The material remaining in the press is stearine while the oil pressed out is called lard oil. This is, of course, merely an outline of the process. It would, however, be impracticable to attempt to make lard oil unless a considerable quantity was to be used. The oil might better be purchased if used in ordinary quantities.

F. J. H., New York.

The horseshoer and auto work.—We have just began to make up auto work for the simple reason that it is being shoved on to us. And this should apply to all smiths. If not now, some time in the future, the smith shop will be as prominent as the garage. Moreso, the auto owner will soon wake up to the fact that the smith can do his auto work the same as the garage man. The time will come soon when auto work will be classed down to that of general repair work. Work on them will be charged for the same as on any machinery. Why not? You watch the smithy from now on and you will see him with an auto tire thrown over his shoulder, holding a horse with one hand and a plow point with the other, with perhaps a spark plug in his mouth. The day for horseshoeing is coming to a close.

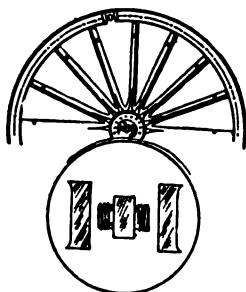
Not long ago I received a letter from a Chicago horseshoer, owner of a shop doing a business of \$1,500 per month. It has fallen to 2/3 of that amount. What will become of the shoer if he does not take in auto work or some other vocation, unless they hike to an autoless country?

JOHN DENBO, Illinois.

A cure for cracked hoof. I see a good many ways in "Our Paper" about split or cracked hoof treatment. Now I am going to give you one that has all clamps and hot irons put in the ancient class and one that I want all blacksmiths to paste in their hats. Buy 5 cents worth of carbolic acid pure, and use as it comes from the drug store. Take the cork, which is large enough, and wet the hair for a space about the size of a quarter just over the crack, once a week for 3 or 4 weeks, and watch results. Do not put too much acid on at one time. I know that this has cured bad cases.

FRANZ P. SCHAAF, Illinois.

Making anchor bolts. Am sending you a suggestion of a tool for making anchor bolts. The tool is made by taking a suitable block of steel and drilling a hole that will take the size of bolt wanted and then cutting a slot for punching the size of key



A STEEL TIRE TIGHTENER

wanted. Heat the bolt to a fair heat, place in block, drop punch into slot and drive clear through. Take from tool and finish with pin to fit hole. This tool has the old way of making anchor bolts beaten a long way. One must keep punch very sharp and square on the edge to get good results. It is best to have more than one punch. A two-inch bolt is easily made at one heat.

H. N. POPE, Connecticut.

A big pile of shoes.—I am sending photograph of a few old horse-shoes that have gathered at my shop in the last five years. The pile is 12 feet high and 4 feet, 9 in. one way and 4 ft. 7 in. the other, that is as near square as we got them. In looking at the picture C. F. G. stands at the right, my man or helper, Henry Goodman, at the left. Our business is mostly with the farmers as the auto has certainly "trimmed" the lively business. There is only one man that keeps horses to let and he only has three. But no matter we still have the farmer.

C. F. GOODNOUGH, New York.

For ants in the lawn.—Here is one, while it has no bearing on the trade, I thought it possible some brother smith might be in the same trouble. I have a fairly good lawn, but every season am troubled with ants eating it and building their homes in it. They are of the big red kind and whatever I put on them that would kill them would also kill the grass, so the remedy was as bad as the disease. I think I have got the best of them now as I have seen none since treating them last. I took a bar and drove several holes down about two feet into their nests. Then I got some wood ashes and a pail of water and I puddled these holes full to the top. My theory is that the ashes created a lye that was too strong for the ants so they quit; at any rate I have seen none since the treatment.

H. N. POPE, Connecticut.

A family of six blacksmiths.—The following item is sent in by Joe. J. Pettigrew, of North Carolina. It appeared in a local newspaper and was written by Annie E. Pettigrew a member of this family of smiths:

"Annie E. Pettigrew sends the following interesting communication to this paper:

"We read a piece in the Blade about a young blacksmith, and wish to say that my father has two boys—my brothers—in his shop who assist him in his blacksmithing. One, Roland Abner Pettigrew, is six years old. He turns the forge for his father and makes rings and staples. My twelve-year-old brother shod his first horse when nine years old. At present he is an up-to-date little 'smith.' He makes shoes, welds iron, makes cold chisels and does a good many other jobs. He can drill a set of new tires or put on any tire that comes to hand.

"Father has raised five boys, and all are fine blacksmiths. They are W. J., T. B., J. J., J. R., and B. F. Pettigrew. Father's initials are also B. F. He is the only horseshoer we know of that can play a tune with his hammer when fashioning a shoe or making nails. He can put four shoes on a horse in seven minutes, and do a good job.

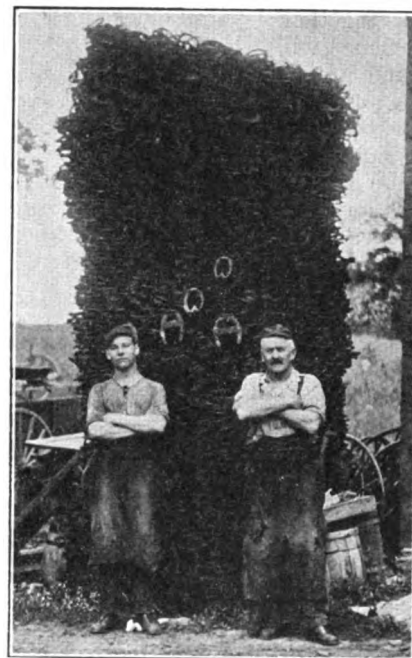
We often wonder if there is any other family that can boast of so many blacksmiths."

If any other reader of "Our Journal" can point out a family of six or more smiths we'll gladly let "our folks" know about it through these columns.

A steel tire tightener.—I have been in the business for 28 years and the item enclosed comes as a real funny article. I have had the clipping on my desk for some time and have had many a good laugh over it. I want to pass it along to all of the boys so they can enjoy it too, for any real blacksmith knows this cannot be done without ruining the wheel. And if it were possible we would long ago have spread the joints of the felloe and put pieces of leather in them. The clipping really should be published on the page with Mutt and Jeff, Katzenjammer, Happy Hooligan and Co. Grant Frazell, Ohio.

Here is the clipping: "To be able to fit a steel tire tightly to a wooden wagon wheel without shrinking and perhaps dishing the wheel, has long been the aim of wagon builders, but this feat has not been

easy of accomplishment in the past. Now along comes an inventor with a most ingenious and practical tightener to be inserted in the wheel in place of a small section of wooden felly, which is removed with a handsaw where two sections of felly unite. The tightener consists of three pieces, as shown in the illustration; two blocks similar to square nuts, with the edges burred over to grip the felly, and a central piece having a threaded projection on either side to engage the holes in the nuts. As one projection bears a left hand and the other a right hand thread, it



A BIG PILE OF OLD HORSESHOES

is obvious that by turning the central piece the nuts will be spread apart, thus serving to tighten the wheel against the inside of the tire."

Business and credit.—Well how is business? With all the hard times I think that the blacksmith has got it a little on them all as the hard times did not seem to make any difference to him. It might have made collections a little slower for a while, but all in all I think that the smithy has about as good a show as any of them. And, of course, you know that it is not like it used to be in regards to collections as I think that the average smith does not allow the long credits that he used to. I know that I do not. I have been "stung" good and proper as I think most of us have but I keep my collections right up. Of course, if a farmer gets a lot of hard luck I will allow him plenty of time, but I make pretty sure that he has had the hard luck and is not throwing a bluff. I have found out that it is better to keep your stock in the shop than to let it out to Tom, Dick and Harry and the first thing you know is you hear of them moving out of town in the night and they have left you the cheerful consolation of going over dead accounts every month.

The trouble with most of the smiths is that they think that they will lose trade by demanding cash, but believe me, you will NOT. I thought so myself but I just made up my mind that I would get my cash or I would QUIT. So I put up a big sign in a conspicuous place in my shop which reads, "ALL WORK STRICTLY



CASH. THIS MEANS YOU." And now I will tell you how it came out: Some fumed and hawed and I lost a few for about three months. They thought that I would go back to the old way but I stuck to it and am sticking to it now, and honestly I am doing a bigger business now than ever before and I am getting my cash. Those whom I know that are perfectly good I give 30 days but no more. Those that I have the least doubt about pay on the spot. Unless, as I say, some fellow has a run of bad luck and you know him to be honest, why then I think that it is our duty to help each other out.

W. W. MORRISON, New York.

A Pennsylvania Clean Shop Suggestion— It has been some time since I have written to "Our Journal," but it hasn't been because of my not thinking of the paper but because I've been too busy. I've just returned from a little trip in which I combined both business and pleasure—that is, while I was away I made it my BUSINESS to call on all the blacksmith and shoeing shops that I could find and I naturally got a great deal of PLEASURE out of these visits.

I saw shops and shops—about all kinds and conditions. As Thornton says, some are shops and some are shacks. And then, too, there are all kinds and conditions of shop interiors. Some are as neat as the proverbial pin, while others, by far the majority, are about as neat as a flat in which a married man has been living for four weeks alone while his wife is away.

It seems very strange to me that so very many shops that one comes across are so really untidy and downright dirty. I've seen some shops that it would really be a crime to house a dog in. And what seems strangest of all is that the owners of these shops are actually ashamed of the condition—at least, I thought so from the way they acted about the looks of their shop when I looked around. But it doesn't seem that the shame they feel is of the brand that makes a man want to clean up and change the appearance of his shop. If these keepers of untidy shops only knew how really better they would feel in a neat shop, if they knew how much easier they could do their work, if they knew how much more work they could do, they would clean up and then

more inviting to me than a neat smith shop. About all I can do is to keep from tinkering about in a shop of that kind.

I wonder why all smith shops cannot be neat and clean, with things in place and machines in order. The craft would certainly get a great big boost if all shops could be put into ship shape and kept so. I wonder if a "Ship Shape Shop League or club" wouldn't be a good idea. How about it, brother readers—are you ready for a "Ship Shape Shop Club?" Let's have some good snappy talk on the matter.

A. J. WILSON, Pennsylvania.



The Automobile Repairman

Removing Pinions and Keys

JOHN DENBO.

The pinion on the axle (right hand) of a Ford is put on with a half-moon key and a collar (in halves). To get this pinion off, warm it good, put the axle in the vise, place a short piece of 1½-inch pipe against the pinion and drive back as in the engraving. In driving back, the collar will drop away as it is in halves. Now take

seat as the pinion gives. If it starts to do so tap it down. Some times keys stick in the seat and refuse to come out easily. After the pinion has been removed, heat it well and remove with pincers. Always see that the key is in good shape before putting on the pinion.

The Farmers' Automobile

F. A. STANFORD

Just about a year ago an Indiana paper published the following little "essay" on "The Farmers' Automobile." The item was interesting then, when some smiths would no doubt have laughed and scoffed at the idea. But now, after seeing what the past year has done for the automobile and particularly on the farm and for the farmer, this article will be taken more seriously and more as an indication of "the way the wind blows."

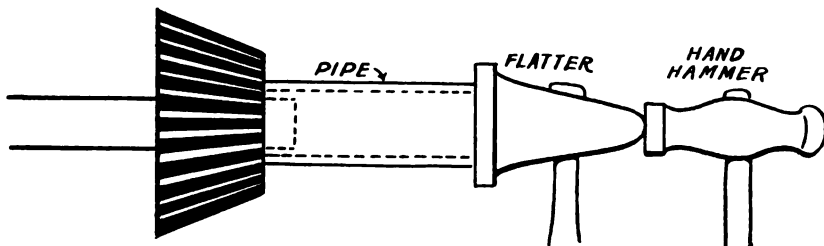
Read this little item carefully and with an open mind. Don't laugh at the ideas it sets forth—nor accept them without a single question. Read carefully and then, think carefully. That is the only way to consider this automobile situation correctly. There are many rumors afloat regarding the automobile and the horse, but the right thinking smith will not be led astray by any loud talk on either the auto-side nor the horse-side of the great question. He'll read carefully the sound, sensible matter of the day and then think out his solution of the problem by applying what he reads to conditions as he finds them right in his own shop. No right thinking smith, using these methods of sound sense can possibly go far astray in his final decision.

Here is the article:

The Farmers' Automobile.

With the bumper crops that are said to be on their way it does not seem extraordinary, perhaps, that the farmers are going in at a great rate for automobiles. In Wisconsin it is reported that the bankers are finding it a serious problem to finance the farmers' demands for automobiles, and it is said that in one agricultural town of 600 people the banks have applications for loans aggregating \$20,000, the proceeds of which the farmers wish to invest in motor cars. The entire investment in the state of Wisconsin is said to be \$60,000,000. It would be dangerous to deduce from this that the American farmer has become so prosperous that he is going in for joy riding. In the cities the auto is pretty largely a luxury, a pleasure vehicle, with the exception of those machines—an ever increasing number—that are used by merchants in their trade.

In the country the automobile is coming to be regarded as a necessity and in the hands of the modern American farmer it has varied uses. The use of a machine saves him valuable time in getting to town when he has to go, and on the farm itself it does a great deal to lighten and



DON' STRIKE DIRECTLY ON THE PINION WHEN DRIVING IT ON OR OFF

keep things right. It is really discouraging to find shop after shop kept in the careless, aimless, systemless way in which most of them are kept.

The well-kept shops, at least as I found them, is the exception. It's quite a puzzle to me how some smith shops can be so very neat while others are so very untidy. The two kinds are so very extremely different that it is hard to think they belong to the same business. Some of the better class of shops are just the best example of good shop keeping that I ever saw. With floor clean and everything in place there is really little that looks better or

your puller and pull this pinion. Don't at any time hit the pinion to drive it off, unless you have a piece of pipe to slip onto the shaft, because if you hit the pinion you will mar it up. The hub you know goes into a close fitting box with a very neat fit. Now when you put on the pinion put in your key, slip the pinion over it and watch the key so that it keeps level with the shaft. That is so it doesn't slip out of its



expedite his labor. On a great many farms the engine of the automobile is hitched up and made to saw wood, run the corn sheller, operate the washing machinery and the churn, and, in fact, its handy gasoline engine is practically worth as much as an extra man about the place.

Not only that, the influence of the automobile in the country is bound to be far-reaching. It will teach the farmer by practical demonstration the need and efficacy of good roads; it will help to do away with that "splendid isolation" which for long years has been one of the bugbears of life in the country and which is responsible for the fact that very many of the women in our lunatic asylums are the wives of farmers.

It means a good deal to the country at large that the farmer should out of the abundance of his crops become a purchaser of an automobile. The trend in this direction will help the banker, the automobile maker and indirectly a host of other people.

It is difficult to realize while reading the foregoing that it was really written in July of last year instead of July of this year. But such is nevertheless the truth and were it possible for one to boil down this item to get at its real substance and then to add to it one-half its own substance, one would, perhaps, be able to get nearer to the actual conditions of things this year. But sometimes it requires a good, hard, long, lasting look backward to make us realize what the present really means.

A Motorcycle Throttle Repair

L. R. SWARTZ

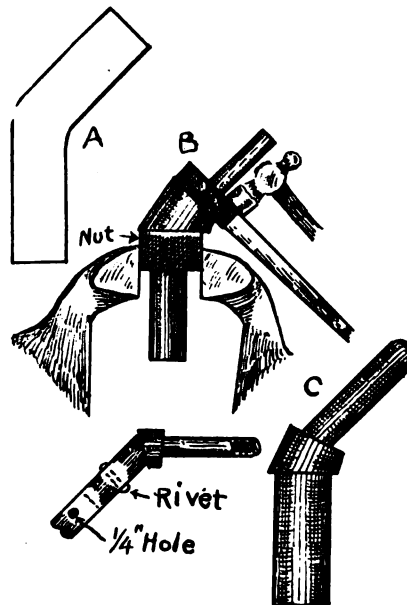
In this case the tempered wire which connects the right side handle to the throttle lever on carburetor of Harley-Davidson machine was broken. The wire was too short to refit and no other wire of proper size and temper was at hand.

The old wire was removed and No. 16 annealed wire put in. A turn was taken at the eye on throttle lever of carburetor leaving enough wire to connect with a coiled spring attached to frame above hub of rear wheel. By this arrangement the spring automatically closes throttle when handle is released. The owner thought it awkward at first, but three days afterward on return trip he told me that it was the very thing and wanted to send me a half dozen such springs as I used making the repair.

The spring used was a five-cent screen door spring 12 inches long with a hook at each end. These coils are about $\frac{3}{8}$ -inch in diameter and made of 16 or 18 gauge wire. A section cut from the spring of a Hartshorn window shade roller will do just as well in case no other spring

is at hand and any copper or iron wire up to size of hay bale wire will answer to connect up. A repair of this kind will last longer than the original stiff wire did because the vibration does not affect it; these hard wires generally break at or near the point where they are bent and riveted to the throttle lever.

I am not anxious for bicycle or motorcycle repair work because I only get paid for about half such repairing I do. A fellow will come in with an old cycle on the bum and after the repair is made you find that he is as badly broke as the cycle



REPAIRING THE FORD FRONT RADIUS ROD

was when he came in. It is unusually easy to find the point of trouble when you tear down the machine, for generally you find many small parts so badly worn that you have to refit nearly the whole business in order to build up a satisfactory repair. They are all built too much like a watch—and a cheap brass one at that. However, a mechanic must be a good Samaritan to the Knights of the Road. That is the reason I have written this—to let some other repairer off easily.

Ten minutes is ample time to make the above repair. Just make a return bend on one end of wire and lay it into controller button of handle, connect up other end and you're done.

Repairing the Ford Front Radius Rod

JOHN DENBO

When the end of a Ford front radius rod breaks an entire new rod assembly isn't necessary and if the

auto repair smith knows how to go about the repair he can place some money in his own pocket that usually goes to the Ford agent or accessory dealer, and in addition save some money for his customer.

The front radius rod of the Ford is listed at three dollars and with the larger portion of the rod in good shape the end can be easily repaired at a small cost, a charge of half that amount, allowing a good profit to the auto smith and also making a good saving for the owner.

To repair the rod which has been broken at the end, take a piece of one-inch round soft steel and bend to an angle the same as the angle of the broken rod end. Measure the end carefully and also the shoulder so as to get the part you make exactly right. Now forge one end down to 13-16 and the other end down to $\frac{5}{8}$. With both ends forged down form the shoulder at the corner of the bend in this way: Place a heavy square out in the vise. The hole of the nut should be just large enough to admit the 13-16-inch end of the piece. Then take your $\frac{5}{8}$ -inch heading tool for over the other end. Now heat the corner of your stock, drop the big end through the out in the vise, place the heading tool over the other end and strike the heading tool until you have shaped up a good square shoulder.

To get the end out of the radius rod, which is brazed into place, heat the end red hot, clamp in the vise and bend rod back and forth, pulling on it as you bend and the end will soon come out. These ends are not riveted in, though you will find a small hole on each side of the plug which is put there so the plug may be held in place while it is being brazed. Cool the end in the air not in water or you won't be able to drill it.

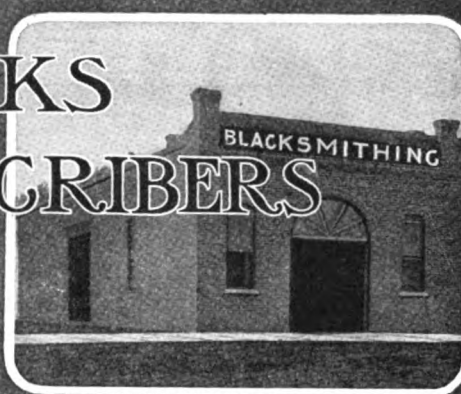
When the end is cool look for a small hole a short distance from the end of the radius rod. If there isn't one there, drill one about $\frac{1}{4}$ -inch in size. (You will find the use of this hole later). Now place your new end in the rod, drill a small hole (about $\frac{1}{8}$ -inch) through rod and new end and put in a rivet, being certain you have the end in the correct position. Now heat the end again, put some prazing compound and spelter in at the $\frac{1}{4}$ -inch hole and braze the new end in place. Now the only thing remaining to be done is to cut a thread on the new end and replace the entire rod on the machine.

Of course, the charge for this work will depend upon the amount of work you are called upon to do.



TIMELY TALKS

WITH OUR SUBSCRIBERS



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Our Program

THE AMERICAN BLACKSMITH for this next year promises to be the best paper that has yet been published. Several minor changes will be made, which we believe will make "Our Journal" much more valuable, practical and useful to "Our Folks". It is not planned, at this time, however, that any great change will be made. The present general plan followed seems to please "Our Folks" and to be really frank with you, Mr. Reader, we are really at a loss to know what to do to further improve the paper. If you have a suggestion, let us have it, please. We find however, that from correspondence with readers, from investigations by our representatives and from other available means which we have used, that THE AMERICAN BLACKSMITH is meeting the wishes of its readers very closely.

Colt Training

In this issue appears the first installment of a paper on "Breaking and Training Colts" by Mr. V. G. Stambaugh of the animal husbandry division of the U. S. Department of Agriculture. This matter is published in bulletin form by the department, but it is of such practical interest to horseshoers and we have had so many requests from time to time for information on the subject of horse training, that our readers will be glad to see this series and to read the articles carefully.

Mr. Stambaugh introduces his subject in a clear, sensible way and must know the horse and colt well. We believe our readers will find much of value and practical worth in Mr. Stambaugh's articles.

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Contents, November, 1915.

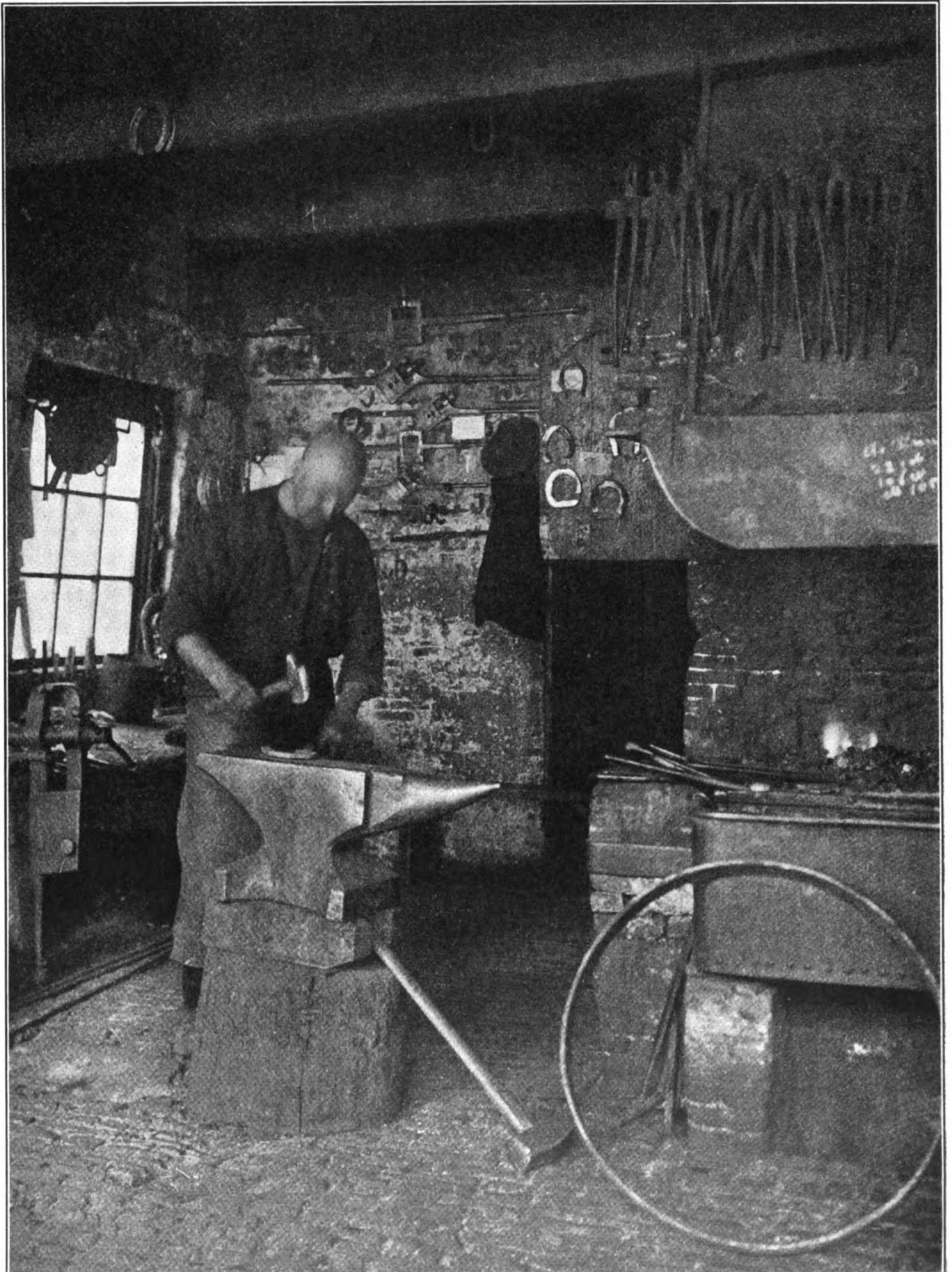
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The Winter Evenings

The long winter evenings will soon be with us with their time for study and reading. What are you going to do? Simply sit around and wait for bed time or are you going to take advantage of the opportunity the long winter evenings present, and prepare for better things? Here is an excellent opportunity to brush up on your trade knowledge. Why not read and study several books on those branches of smithing on which you are rather lax. If you do not know what books you want ask our Book Department for a list of our smithing craft books. Or tell us what you want to study and the Book Department will tell you what books to get. If you expect to take up automobile work next spring, why not prepare yourself during the winter evenings? A few well chosen books on automobile construction and repair will make the actual auto work easy. Better write the Book Department right now.

Your Experiences

Remember, Mr. Reader, that we depend upon you to a certain extent to tell us what is going on in your shop and in your locality. We want every reader of "Our Journal" to feel that it is his duty to write a letter at least once a year to "Our Journal" and to "Our Folks". If every reader would do so this paper would be the smith's own paper even more than it is. But every year some of "Our Folks" seem to forget about their letters and consequently the other readers are the losers. If you haven't yet written a letter for publication this year, won't you kindly do so now? There are not many weeks remaining in this year and if you don't do it soon the old year will slip into the new without your having done what we want all readers to feel is their duty. Let the editor have something interesting and practical from you—ask a question if you cannot think of anything else, but do write something.



THE HORSE SHOER



A Stock Record and Cost System

A. F. JACKSON

IF you were asked what fixes your profit—cost or price, what would you answer?

In other words what factor enters most into determining the profit you are to get—is it the price you get for your work or the cost of doing that work?

The old popular idea was that selling price determined the profit—today business men in all lines are paying more attention to cost as the determining factor. Therefore the greater attention paid to cost accounting in these days.

Competition has placed the factor of selling price where it cannot be changed or altered to any very considerable degree. The coming of a competitor sometimes even lowers the price to a point where ordinarily no profit remains after the cost is deducted. It is therefore up to the live business man to find some way of continuing in business and yet to make a profit. The only course open to him is to pay more attention to costs. For when costs are lowered profits increase even though selling price remains the same. Thus is the importance of cost keeping borne in on the practical business man.

The need of some system of cost keeping must be apparent to every smith shop owner whether he employ a force of considerable proportion or have work only for the usual helper and himself. Some means of keeping track of what things cost must be used. In the small shop the system, if it may be so-called, will naturally be of the simplest, while in the big establishment it will be as elaborate as the needs and requirements dictate.

The system described here is, of course, too elaborate for use in the very small shop, but it embodies so thoroughly the ideas and factors that should be carried out in a good cost system that it may be taken as a guide in the planning of simpler or even more elaborate systems of cost recording. The system described is used by a number of shops in

various sections of the country and can be adopted to fit the requirements of practically any line of work.

The Want Slip

The first form used is called the Want slip. This form is simply a memorandum of what material is needed or wanted. These slips are made out by the workmen themselves or where one general stock room is kept, the slip is made out by the employee having charge of the stock.

The office on getting this memorandum makes out an Order Slip on which are recorded all the information regarding the material ordered. And it is well to make this record in duplicate so that a copy may be retained in the office. Many a smith after the traveller has left the shop or after the order has been mailed has been puzzled as to whether or not he ordered such-and-such material and if certain other required articles were included in the order. The copy is also valuable for checking purposes when the material is received and again when the bill is audited.

The Stock Record

The Stock Record is the next form. On this record should be kept

all the necessary information regarding the stock on hand, the day ordered, when received, the quantity, price and then the quantity used, the price of it and the balance. A record of this kind shows instantly the amount of stock on hand, its worth, and by it purchases can be determined.

These records are the foundation of your cost accounting system. On them are based your costs and here must begin all factors that have to do with your profits and earnings. If you do not start with a correct cost figure you cannot arrive at a correct profit figure nor a correct selling price. This then is the true and correct foundation upon which to build your business.

Using Cost Figures

Now to use the figures given you by your cost system.

The next form illustrated is the Job Ticket or Slip. This slip accompanies each job through the shop. On it are written the customer's name, the work to be done, the material used, the time consumed in doing the work and such other information as enters into the pricing of the job. Thus an accurate basis is secured for determining the price of the job. If a price had to be made to the customer before the job was started the exact profit or loss is

WANT SLIP		NO. - DATE -
QUANTITY	MATERIAL	DATE NEEDED

FIG. 1.—SHOWING THE WANT SLIP ON WHICH A MEMORANDUM OF STOCK NEEDED IS KEPT



ORDERED			
		NO _____ WANT SLIP NO. _____ DATE _____	
FROM _____			
TERMS _____			
QUANTITY	MATERIAL	PRICE	WANTED

FIG. 2.—THIS FORM CARRIES THE RECORD OF THE STOCK ORDERED

easily and quickly determined. And in a case of that kind the figure quoted had better be marked on the back of the Job Slip so that no error may be made. However, it is sometimes well to keep such information from employees and the figure may then be placed in a small book kept for that purpose and marked "Quotation Made."

Of course, in connection with this stock keeping record and cost system the expense accounts usually kept, must be considered. Rent, taxes, telephone, light, heat and similar items that go to make up the Overhead of the shop must, of course, be known in order to arrive at a safe and same quotation to the customer.

Results

And the results secured by installing a system of cost keeping will enable the shop owner to point out surely and positively those items where costs are creeping up and where and at what points costs can be trimmed and cut. The real worth of a cost accounting system is not in its enabling you to price work correctly and safely (through this is a big gain over haphazard methods), but in the fact that you know positively just where you stand in a business way and that there are no hidden secrets in your business. To be able to say that such-and-such work or operation in your shop is costing too much is half the battle in your endeavor to cut that certain cost. To be able to place your finger on work that is costing more than it is bringing into the cash drawer makes for confidence in a business way and many times spells the difference between the successful and the unsuccessful shop.

Cost accounting, so the small shop owner thinks, is something for the

big shop only. But the small shop needs and requires it just as positively. True, the elaborate system of the large establishment is not suited for use in the small shop, but the small shop can adopt the larger system to its needs, cutting out the forms and moves unnecessary in the small shop and still have a system that will fit every purpose—that of knowing positively just where the business stands, its costs, its profits and its prices.

Making Opportunities

F. J. ASHLEY

It is by no means necessary for the general smith to sit calmly by and accept conditions and trade as they come to him. And the real live smith will not do so. It is possible for

keep his eyes, ears and brains working.

To illustrate just what is meant: Suppose Mr. Farmer comes in with a broken double tree which has been repaired on many previous occasions, but which is perhaps good for another repair. Are you going to calmly fix it up and not say a word about a new one? Of course not. You repair it, but suggest that Mr. Farmer order a new one, somewhat heavier so that he need not undergo the repeated annoyance of waiting for repairs on the old one. Suggest his using the old one on lighter work.

Next comes Mr. Drayman with another hole in the floor of his dray. He has had it patched so many times that it now looks like an old fashioned crazy quilt design. When you suggest a new floor, a bit heavier to take care of the heavier work he now does, do you simply accept his excuse of "have no time—too busy to tie the rig up", or do you suggest measuring the box and getting out the floor and then putting it in the first half-day he can spare?

That is making opportunities.

To cite another case: Suppose you are taking an occasional order for a gas engine. When you get such an order do you suggest supplying the necessary equipment for making that engine really efficient for your customer? How about selling him the belting he'll need and the pulleys, hangers, shafting and the machines he wants to run with it? Is there any reason why you cannot get

STOCK RECORD							
MATERIAL	ORDERED	RECEIVED	QUANTITY	PRICE	USED	PRICE	BAL. ON HAND

FIG. 3.—THE STOCK RECORD IS JUST WHAT ITS NAME IMPLIES

almost every general smith to control business to at least a certain extent, and to grab opportunities that he will see daily if he will but

this business as well, with the resulting profits?

Even when a customer comes in to have his horse shod and you see that



some work is needed on his wagon or buggy or whatever the horse is hitched to, suggest doing the work, if not immediately, then at some future date. If he hasn't time to wait, suggest in a tactful way that he allow you to measure for the repairs so you can get the parts out and then he will not be delayed any more than is necessary when the parts are put into the vehicle. Of course, this plan cannot be worked on all repairs, but a lot of work can be done in this way.

These suggestions are just a few of the ways in which the general smith can make opportunities. If the practical smith will keep his brain working all the time he will find opportunities presented with every customer that comes into the shop. And while it will be impossible to secure all of the work along the lines suggested some of it must eventually come his way if the smith will use tactful methods and be tactfully persistent.

Breaking and Training Colts*

V. G. STAMBAUGH

Animal Husbandry Division United States
Department of Agriculture
Introduction

The breaking and training of colts is of prime importance, because their future value and usefulness depends to a great extent on whether or not they are well broken. By a broken colt is meant one that is safe to handle in the stable or on the road and that will promptly obey the orders of the driver or rider.

Memory and habit are the two main factors with which we have to deal in training horses. A horse acts through instinct and habit, and one of its greatest characteristics is uniformity of conduct. What a horse is once trained to do he will nearly always do under like conditions.

The first thing in training a horse is to get his attention. The second is to make him understand what is wanted. The education of the horse is based on reward and punishment. The reward, a pat on the neck, etc., should immediately follow the act of obedience. The punishment, to be effective, must immediately follow the act of disobedience.

Few horses are inherently vicious. Many horses are made vicious and unreliable by the carelessness or unnecessary brutality of their trainers. If a horse kicks because the harness

hurts him, or shies at something of which he is afraid, punishment is not justifiable. If, however, after being stopped, a horse starts before receiving command to do so, he should be punished. Horses are naturally obedient, and when thoroughly trained their conduct is uniformly good.

A horse should be trained so that he thinks there is no limit to his power to do the things required of him, and believes that he has no power to do that which is against the wishes of his driver. Above all, never ask of a horse something he is unable to perform and then punish him because it can not be done. If during the first year of his work a colt is hitched only to loads

from weanlings to old horses. The instincts in a horse which are opposed to obedience to man increase in strength with age. This accounts for the difficulty encountered in handling range horses that are allowed their freedom until their instinct of independence is so strongly developed that it is proportionately difficult to teach them that it is their duty to obey some force other than their own instinct.

First Steps in Breaking

It is a great advantage to begin the education of the colt as early as possible. The plan generally followed is to break the colt to being led and handled before it is weaned, and to break to harness between the

JOB SLIP					NO. _____
					DATE _____
CUSTOMER _____					
WORK TO BE DONE _____					
STARTED _____ FINISHED _____					
MATERIAL USED	COST	TIME HRS. MIN.		WORKMAN	REMARKS
TOTALS					

FIG. 4.—THIS SLIP SHOULD FOLLOW THE JOB INTO EVERY DEPARTMENT OF THE SHOP

that he can pull, he will develop into a good work horse, while if he is overloaded a few times he may become balky and worthless.

All horses can not be treated alike. A high-strung, sensitive horse must be treated gently, the dullard sharply. The same force applied to the sensitive horse that is necessary to make the dullard act would be likely to cause the high-strung horse to rebel, while gentleness would obtain obedience.

To train horses successfully a man needs to exercise great patience, gentleness, and firmness. If you are training a horse and lose your temper, you had better put the horse into the stable until the next day, for further work at this time will be worse than useless and may undo the work already done.

Age to Break

Horses are broken at ages ranging

ages of 2 and 3 years. Colts should not do heavy work until they are 4 years old, and should be accustomed to it gradually.

Before a colt is broken to being led it should be taught to stand tied; this applies to unbroken horses of all ages. To do this, put a strong halter on the colt; then take a rope about 14 feet long, double it, putting the loop under the horse's tail as a crupper, twist the two ropes together about three times, then let one rope come forward on each side of the horse, and tie the ends together in front against the chest just tight enough so that it will not drop down; then run a surcingle loosely around the horse behind the withers, tying into it the crupper rope at both sides. Have an additional rope, about 12 feet long, run it through the halter ring, and tie it at the breast to the rope that forms the

*See "Colt Training" under Timely Talks with Our Subscribers.



crupper. Tie the other end of the rope to a solid post, allowing about 3 feet of slack. (See fig. 1.) Leave the colt tied for an hour. Another method is to have a loop in one end of the rope, run the lead strap through this loop, and tie it with a little slack to the rope that forms the crupper, the other end of the additional rope, of course, being tied to a solid post.

Gentling the Colt

While tied the colt should be gentled and accustomed to being handled on both sides, on the hind parts, and on the legs. To do this, hold the headstall in one hand and

or upon him.

Another method of gentling a horse is to tie the halter rope to the tail, as shown in figure 2. This forces him to go in a circle. When he gives in and stands quietly he may be harnessed, saddled, mounted, accustomed to strange sights and sounds, and handled with safety. This is one of the best aids in use in gaining a horse's submission.

Breaking to Lead

The horse is now ready to lead. Loosen the rope from the post, step off from the horse, and tell him to "come," following the command with a pull on the rope. As soon as

pertaining to work, and on account of the mother being so near he will soon become familiar with such surroundings and lose his fear of them.

To break to lead without crupper ropes use a strong halter with a lead rope. Step back about 6 feet from the colt, opposite his shoulders, cluck to him, and pull on the rope. The colt will be forced to take a couple of steps; reward him; cross in front to a similar position on the other side and repeat the command with a pull. Continue the lesson until the colt follows. Never pull straight ahead on the colt; he can outpull you. Use diplomacy rather than force.

NOTE—The next installment of this series will take up the subject of Handling and Trimming the Feet, and Driving and Riding.

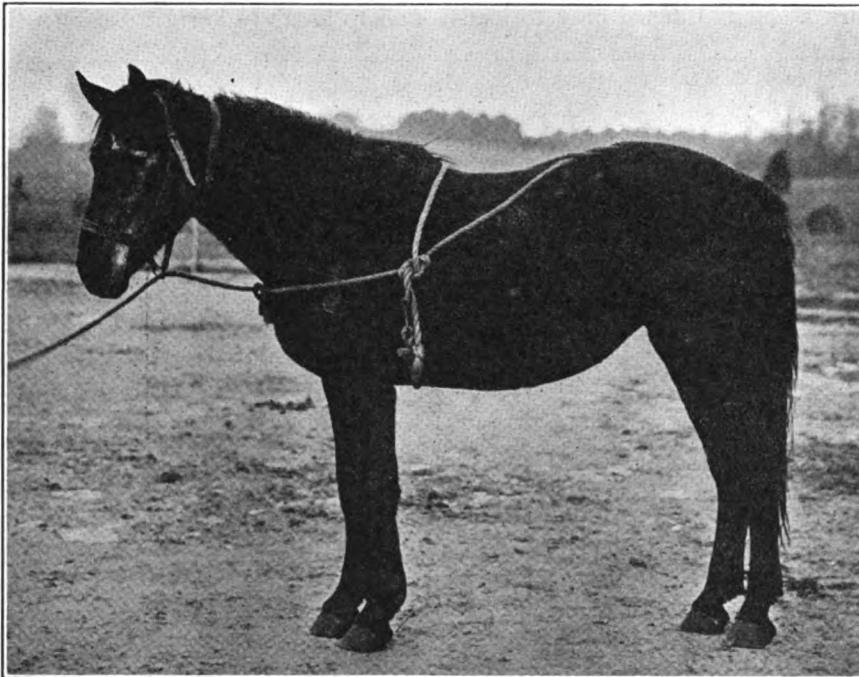


FIG. 1.—ARRANGEMENT OF HALTER AND ROPES FOR BREAKING A COLT TO STAND TIED AND TO LEAD

with the other hand gentle (that is, pet and rub) the colt, first on the neck and head, then on the back and sides, and last on the legs.

To gentle the hind parts take a stick, about 4 feet long, wrap a gunny sack around one end, and tie it. Allow the colt to examine it with his nose. Then rub it all over his body.

With this arrangement the colt's hind legs may be rubbed without placing one's self in danger of his heels. If he kicks at it do not hit him, but allow him to examine it again, and proceed as before. This lesson should continue until the colt will stand being approached from either side and rubbed all over. The second day he may be tied up again and further gentled with sacks, blankets, and noises until he has no fear of them around him, under him,

the horse advances pet him, then step away and repeat. He will soon follow without a pull on the rope. Half an hour's leading and this lesson is over.

The next day the crupper should be put on at the beginning of the lesson, but should be discarded after a short work-out and the halter alone used so that the colt will not depend on the crupper rope. These lessons should be continued until the colt leads satisfactorily. If a colt is still running with his mother, it is a good idea, as soon as he is broken to lead, to tie his halter rope to his mother's trace if she is being worked. The tie should be made at about the union of the backband and the trace and short enough to prevent the colt from getting in front of the team. This will acquaint him with the general conditions and noises

On Correcting the Horse's Gait

L. R. GARWIN

In looking over the columns of the September number was interested in Dr. Seiter's writing on shoeing. I have not had the experience of twenty-five years, and do not know as much about shoeing as Dr. Seiter, but I do not think, by his writing, that he has had as much experience with draft horses as with track horses, and the best ones at that, "I mean best bred, best conformed, best gaited, and best cared for."

The drafters have to be shod so the shoes will wear on the brick, most of them wear their shoes out on the outside as he says, "on the heel." The toe hasn't as much to do as the heel. Keep the heel level and the toe will wear level enough. What will you do, make the outside still lower? No, the lower it is on the outside, the more weight there will be and the more the shoe will wear on the outside. Build him up on the outside and throw the weight over on the inside. Some horses can be stopped in two or three shoeings so they will wear their shoes straight, especially young horses. Unless the horse is sore on one side of the foot then you will have to find some other remedy.

I have had horses that wore their shoes almost straight and for some cause that could not be found, perhaps a slight strain, would start to walk on one side of their foot. If you let a foot like this go too long and don't brace it up on the outside the horse will stay that way and will always wear his shoe on that side. But if the shoe is built up on that side and the horse is made to walk on the other side of his foot, lots of



them can be made to wear them level and all of them helped some.

Will the high side of the foot land first on the ground? I say it does not, it does in some cases in front, but mostly on the low side behind.

How about the hind feet of the road horse that have to be shod with a heavy shoe? Two-thirds of them wear their shoes off on the outside. When a horse is driven barefooted behind he will wear his feet off on the outside until he can't walk any more, and the inside will have one-half inch of good wall. Which side does he land on and which side has the most weight on it—the inside or the outside that is worn nearly to the hair?

I am shoeing a horse now that goes more miles and is driven faster than any horse in town and is the best road horse I know of. When I commenced to shoe this horse he was very low on the outside of his hind feet. I built him up on the outside and his feet are now more than an inch higher on the outside than they were and he wears his shoes as thin as paper and almost level. Before, he scarcely touched the inside and interfered some. Which side carries the most weight and lands first? I have had a dozen the same as this case. If our drafters and road horses were cared for as well as our track horses we wouldn't have as many crooked and bad feet to work on, but no difference what kind of feet they have we have to shoe them so the shoes will wear and with the least expense as possible, so the horse can do the work. We all know that lots of horses would be far better off shod with plain plates, but we are doing this for the man that pays the bills and we have to satisfy him.

In regard to the freak shoes I have the same opinion as Dr. Seiter. I have seen different men with cases of shoes and have heard them tell how many different patterns they have, but they couldn't tell what they were for because none of them were used with any advantage to a horse. I believe in plain shoeing and have never had very much trouble with horses interfering, and believe the way the horses' feet are cut has more to do with his gait than the style of shoe, but the weight and pattern have to go with it to make them go right.

I have not had a great deal of experience with track horses, but would like to see the two hundred horses among which you could find scarcely any that wore their shoes crooked. It is not much trouble to

level most track horses' front feet so they will wear their shoes level, but I can't find fifty out of two hundred that wear their shoes level behind. As I have said, over two-thirds of them wear them off on the outside behind. What will you do, cut them down on the outside, as I understand Dr. Seiter? I have shod some pretty good horses that wore

able position so as to bear his weight on three legs. This is well worth noticing and the horse will easily assume such a comfortable position if gently moved over till his feet are straight under his body. In raising the feet no unnecessary pain need be inflicted by pulling or lifting a limb too high. The wise shoer avoids all clamor and disturbances; quiet,

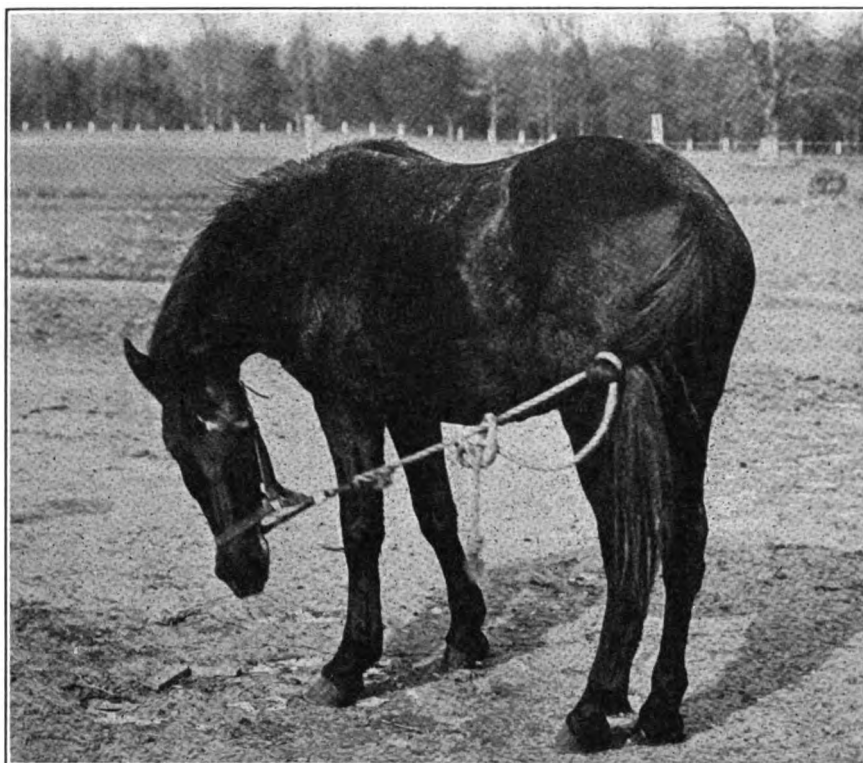


FIG. 2.—ONE METHOD OF GENTLING A COLT

their shoes level in front but scarcely wore them any on inside behind and if you would let them get a little low on outside they would speedycut or crossfire. On the other hand, if you would take a little off the inside they would never touch. Now, when you say, take off where the shoe is worn, it will work in front on most speed horses, but to take it off behind I can't see that it will work on most cases. On draft or road horses it won't work at all.

A Few Notes for the Young Smith

THOMAS NORTHWOOD, A. F. C. L.

Raising and Holding the Foot to be Shod

As this is one of the first jobs that the young horseshoer is put to do, a little advice on this matter may not be out of place. This can be carried out much easier if certain rules governing this work are observed and carried out. In the first place, see that the horse stands in a comfort-

quick methods are the best. In young horses the feet should not be held up too long at a time, let them down occasionally. In stiff horses the feet should not be lifted too high, especially at the beginning. The shoer should study the horse's temper. Vicious horses are sometimes encountered and have to be treated accordingly. Watch the play of the ears and eyes. In these cases a trustworthy man should always be at the horse's head, and exhibitions of temper should be punished by jerking the bridle, or backing him quickly is very tiresome to him. Ticklish horses may be taken hold of boldly, as light touches of the hand are more unpleasant to him than bold handling.

Removing the Old Shoes

If the feet are healthy all the shoes may be taken off at the same time. But some diseases of the feet will not allow this to be done. In the first place see that all the clinches are properly raised. Then



with the pinchers pull first one heel then the other, towards the toe, drawing the nails as they become loose. Care should be taken in this operation, as excessive twisting of the hoof should be avoided. Also by levering the pinchers towards the frog the soles on flat-footed animals are bruised, causing lameness and corns.

After this operation comes one of the most important steps in the art of shoeing, that is preparing the foot to receive the new shoe. As you are no doubt aware that the real object of shoeing is to prevent the wall of the foot from wearing faster than it grows. This should be borne in mind when getting the foot ready and the wall of the foot should receive special attention. The tools required are a pair of sharp nippers and a rasp, if the foot is overgrown. Lower the wall on a level with the outer border of the sole and in all normal feet keep the foot level. The sole and frog need not be interfered with as these are capable of looking after themselves. The bars should be lowered on a level, with the wall which increases the bearing surface at the heel for the shoe. It is a good plan, when getting the foot ready, to straighten yourself up and glance down the foot. A better view can then be obtained to get the horizontal bearing surface of the shoe. The young shoer should always guard against overlowering at the parts most convenient to work on. This is generally the right hand side heel. Finally, run the rasp round the outside edge to prevent any breaking of the foot while the opposite foot is being got ready.

Preparing the Hoofs for Going Barefoot

This is recommended and necessary at times when from various causes horses are to take a rest and turned out to grass. After the shoes have been removed, lower the wall all around, and around the outside edge of wall. This will prevent pieces of the wall breaking away and the operation should be repeated at intervals while out at grass. The same treatment might be practiced on colts, then the feet would be in better condition when the time comes for them to be shod.

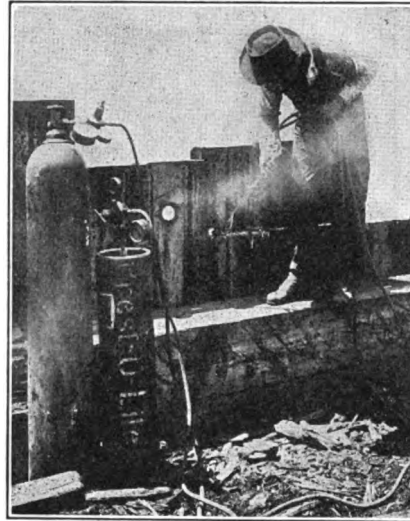
Cutting Sheet Steel Piling

The Florida East Coast Railway Company is just completing the construction of a large drawbridge which spans the St. John's River at Jacksonville, Florida. Lackawanna sheet steel piling has been used in the construction of the protection

piers. This piling is driven down in sections. Each sheet or section consists of $\frac{3}{8}$ -inch web, being about $2\frac{1}{4}$ inches thick on the lock joint.

In all, approximately 860 feet of piling had to be cut off at a uniform height. An oxy-acetylene cutting blow-pipe was used, employing Prest-o-Lite gas and compressed oxygen, both in portable cylinders.

On account of the peculiar construction of the lock joints, the operator was handicapped in making



CUTTING SHEET STEEL PILING WITH THE OXY-ACETYLENE TORCH

speed, although the work was completed at an enormous saving over the old method of sawing through, which would have been an extremely slow and tedious operation.

At the lock joint practically four sections of metal had to be cut through, requiring frequent changes in the adjustment of the blow-pipe. Nevertheless, it is stated that between forty and fifty lineal feet of piling was cut in seven hours, one man handling the entire job. This is many times faster than the speed of the ordinary hacksaw, which on such a job would require the services of at least two men.

The cutting followed the pile drivers so closely that virtually no time was lost.

Providing a Safe Place For the Employee to Work

ELTON J. BUCKLEY.

The following letter comes to me from the West. It allows me to raise and discuss the whole question of an employer's legal obligation to furnish his employees with a safe place in which to work:

I want an opinion as to the liability of the smith under any existing law in the State of Illinois.

A firm composed of two men, adults,

own a shop with a work room and engine in the basement, located in an Illinois town of about 1,500 population. A man about thirty-five years of age, had been in their employ probably a year or more in his capacity as general worker, spending all of his employed time in the basement shop, when he contracted what three physicians pronounced tuberculosis of the throat, and is now unable to speak, and with chances against his recovery.

All three of the physicians state that his disease is wholly due to insanitary condition of the shop and will give testimony to that effect.

Is the firm liable for damages to the man or his family, and if so, to what extent?

Although this inquiry is limited to conditions of the law of Illinois, I can answer and discuss it in a general article going to all sorts of employees in all the States of the Union, because the law of Illinois as to such cases is no different from the law of other States, and the liability of other employers as to providing employees with a safe place to work, is precisely the same.

Any employer, who keeps his premises in such an unsanitary condition that an employee contracts a fatal disease in consequence, is liable in damages—unless it can be shown that the danger was open and obvious, and the employee, by continuing to work there, deliberately courted it. If the employee recklessly exposed himself in full knowledge of the danger, he cannot recover damages; the law would hold that he took a chance and lost.

Illinois and the large majority of other States have laws requiring establishments to be kept in a sanitary condition, but those laws neither increase nor reduce the employer's liability. Without any State law, and purely by virtue of the common law, an employer is bound to keep his place in a sanitary condition, and if he fails to do it and some employee is innocently injured, the latter can recover damages.

The fundamental rule resting upon all employers is as follows:

Employers must provide for their employees a reasonably safe place to work, and must maintain it in a reasonably safe condition during the employment, having regard to the character of the employment and to the danger that a reasonably prudent man would expect to encounter under the circumstances of each particular case.

Of course every kind of employment has a standard of safety all its own. Some businesses are necessarily dangerous, and the employees know that when they enter it. Therefore they could not recover damages which resulted from an accident which was the natural result of that kind of business. The average business, however, is not in itself dangerous or even risky, and the employer who subjects his employees to any unnecessary dangers, either through something like machinery, or through the filthy way he kept his place, is liable to injured employees in damages.

An employee of any business assumes all the ordinary risks of that business, and he assumes all other risks which while they may not be the ordinary risks of the business, are nevertheless so open and obvious that he cannot fail to see them. Here is this rule, quoted from a leading case:—

"If the place is obviously unsafe so as



to charge the employee with knowledge thereof, and he nevertheless enters on the work, he assumes the risk".

In such a case, as I have already said, he could not recover damages if anything happened. If an employee knows of the danger in going ahead with the work, under conditions as they exist, or if the danger is so evident that an ordinarily prudent man would have seen it, and he continues in the employment without complaint, or without assurance by the employer that the danger will be lessened or obviated, he cannot hold the employer liable for injuries received in such employment.

Employers' liability laws, such as are being gradually passed by the different

a hard thing to prove, and I am afraid the employer in that case would have very little chance to escape. With three doctors ready to swear that the premises were in condition to breed tuberculosis, and with an employee, exposed to those conditions, contracting tuberculosis, it would appear as if the case against him were complete, unless he could show:—

1.—The man's disease did not come from that; he had it before he came with me. Or

2.—The premises were not in such a condition as to make tuberculosis certain or even likely. Or

3.—If they were, it could not be helped. Unsanitariness is an inseparable incident of the business. Or

instead of getting enough to cover impaired earning power, the sum will be compensation for complete loss of the man's earnings for a period equal to the difference between his age when he died and the age to which he would probably have lived under the tabulated average.

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A Few Notes on Bolt Making

DAYTON O. SHAW.

Making bolts is one part of shop work that pays well with the right



LOADING AN ITALIAN WINE CART

THE BOTTLES OF WINE ARE THUS HAULED TO MARKET. NOTE THE SMALL WHEEL IN FRONT END OF CART TO STEADY THE VEHICLE IN CASE THE HORSE STUMBLES. THE ITALIAN BLACKSMITH WORK IS UNUSUALLY SUBSTANTIAL.

States, do not usually prevent an employer from making the defense, in an action for damages, that his employee was guilty of contributory negligence, or that he incurred the risk with his eyes open. Such laws can do this, however, if the legislature wishes to make them do so, and they have been held to be constitutional in at least one state.

When could an employee be held, by going ahead, as having consented, so to speak, to work in an unsafe place? In the case of the Illinois correspondent, it would have to be shown, to convict the employee of carelessness in continuing to work, that the premises were so filthy and foul that any ordinary uncultivated worker should have known that if he stayed there he would run the risk of tuberculosis or some other disease. That would be

4.—The employee knew all about it and preferred to take a chance, rather than try to get another job.

The above principles apply equally to all kinds of dangers—insufficient lighting, unguarded stairways or hatchways, exposed machinery, improperly guarded elevators, or faulty elevators, boxes left lying around in dimly lighted places to fall over, and all sorts of conditions which make a shop unsafe to employees.

What is the measure of damages in such cases? It is such a sum as will compensate the injured employee for his pain and suffering, cover the cost of doctors, nurses, medicine, etc., give him back the wages he lost while laid up, and—if his earning power is permanently impaired—make that up to him also. If he dies his family can get all of the above items, except that

equipment. One can make a part, if not all, of his bolts from waste and consequently save that much. The writer would not think of running a general repair shop without a bolt header. They are not an expensive machine and one will soon pay for itself. The dies are made of cast iron and one can form any shape head he likes, round or square, countersunk heads, T-heads or heads with spurs. This machine is handy for working hubs or bosses on forging and also for binding angle irons.

Besides one needs a couple of cupping tools, one for bolts and one for



rivets. The one for bolts should be a little flat in the bottom of the cup. or Frivets it should be round in the bottom. Bolts up to $\frac{1}{2}$ -inch can be sized with an allow end mill in the upright drill. Clamp a socket on the center of the drill table, stand the bolt head in the socket, run down the mill and the bolt centers itself. You can get any size mill made at the machine shop that will fit the drill press. I think one of the great problems in the trade is to have something that will hold your work securely. There is time and energy lost in not having proper tools to hold the work firmly, and it gets on a man's nerve, too.

Iron Gateway to a Private House.

JOHN Y. DUNLOP

The modern revival of taste for and appreciation of the ornamental part of smith's work has led to its introduction in many ways in domestic work. The example shown of the gateway to a city house shows the artistic capabilities of wrought iron and how it may be used for this particular purpose. Of course everybody is not prepared to spend the money required to produce such artistic work and this is the principal reason that we find the founder in supremacy. There is, however, no comparison in the final results for, as a rule, the cast work is a tasteless row of monotonous palisades which are the masterpiece of malformation. The art of the founder, whatever be the metal in which he works, can never hope to command the highest homage of a cultivated taste. That is reserved for works which owe their fitness and beauty to skill of hand individually applied in iron and other metals.

In the half-tone illustration the gate shown is three feet, six inches wide. The fixed panels are twelve inches wide, which make the opening between the end of the parapet wall something like five feet, eight inches. The fixed panels are each made in a complete frame which are filled in with beautiful scroll work. Each of these frames are held in position by two shaped stays, made of 1 and 3-16 of an inch square iron, and the detail of the section of the side panels show how these are forged and welded to the frames onto which the gate is hung.

The lintel of the gate which is the support for the scroll work overhead is 1 and 3-8 of an inch square.

This part has evidently been prepared with the scroll work in the middle and the side scrolls as one-piece and has probably been riveted to the side frames in position. The treatment of the scrolls in the overhead part are very simple, but it has some beautiful foliage which, combined with the graceful outline of the tracery, give it a graceful effect.

The lines of the gate are exceedingly simple, still it is quite in keeping with the side and upper parts. A detail is given of the ornamentation on the top of the lock rail, which, on close examination, shows clearly that all those little details

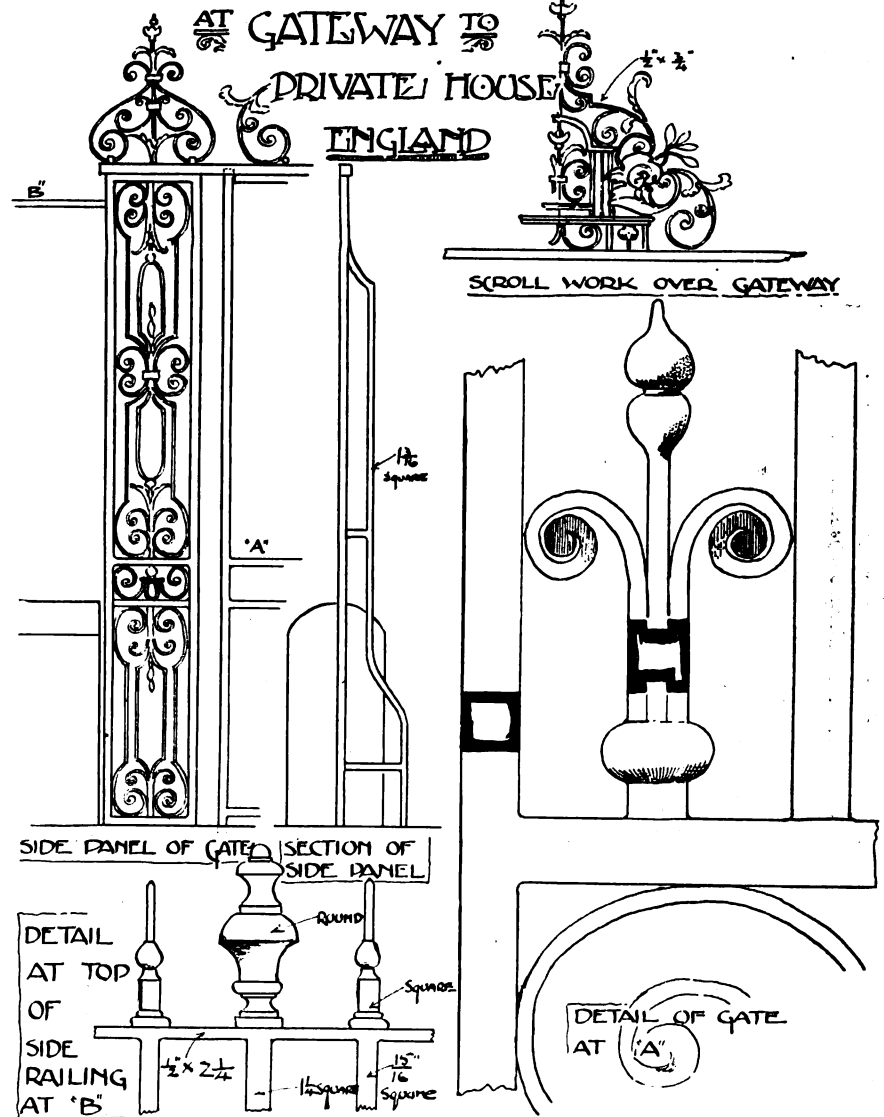
previously made. The great uniformity obtained could not possibly have been secured in any other way. The modern worker, too, must adopt this same method if he wishes to imitate and rival those early workers and produce as they did with hand and hammer only.

The Theory and Practice of Hardening—IV.

J. C. WEST.

Thus far I have felt principally with the theory of the changes in steel, and at some length. But an exact knowledge of the properties of a material, and the forces employed in working on it, insures its better treatment, and secures uniformly su-

DETAILS OF IRONWORK



HERE ARE SHOWN THE DETAILS IN THE CONSTRUCTION OF THE GATES SHOWN ON PAGE 37

must have been formed to carefully prepared drawings and in case where many pieces of a precisely similar shape were required matrices to form them must have been

perior results to those due only to blind, deaf-and-dumb practice. It is said "a blind pigeon may find a pea," and on the same principle blind practice may produce good results sometimes; but this does not detract from the rule that sight is



best. Yet many workman are too self-satisfied with empiric knowledge. I have been made to ache sometimes by the sapient air of profundity with which some banal fact has been imparted to me, accompanied by a strongly-expressed contempt for "books." "Tis books will cause the flag of peace through earth to be unhurled," we are told; but books will do more still, for they will enable the flag to be better and

have made myself and used for hardening and tempering, with very good results, even if they were not ideally perfect.

It will be remembered that raising steel above the calescence point makes it coarse in grain, so reducing its toughness. In heating a turning-chisel in the forge, it is next to impossible, but that the thin portion, particularly the edge, should be heated above calescence, although perhaps

The use of a molten bath obviates all risk of overheating any part of an article, for even if that part be as thin as paper it cannot rise in temperature above the degree of the molten bath; the thin part might attain that temperature much sooner than the thicker parts, but it cannot rise above it, and will simply keep at that temperature, whilst the thicker part is absorbing the necessary units of heat to bring it to the same degree as the thin part. I will describe a bath I have made in several sizes, for different articles, that is very simple and inexpensive, but answers the purpose well. Take a piece of 1½-in. iron gas-tube, or, as some style it, gas-barrel, flatten about 3-in. of the end, put some welding flux in the flattened part; let it run between by heating the end of the pipe together, being careful that the weld is a perfect closing of the end. Now bend the flattened part over, and hammer it close to the pipe, leaving a round end to the closed pipe. Cut this off the length likely to be wanted—say, 5-in. or 6-in. Get some lead that is quite free from sinc, sulphur, or arsenic (old sheet lead I have found answer very well, but gas compo. pipe will spoil any steel); cut it up, fill the pipe ladle with it, put it in forge fire, which is best made with coked coal from which most of the gas has been driven, otherwise the flames will obscure the workman's view of the inside of ladle. (Coked coal should always be used for working steel in a naked fire, as most coals contain some sulphur, and if these coals are fed to the fire green—i.e., as they are before being heated—this sulphur will, in part, enter and injure the heated steel. By previously caking them on the forge fire, most of the sulphur is driven off by the heat). Melt the lead and skim off any dirt. The height the lead should be in the ladle when melted depends upon the steel article to be heated, as the thicker it is the less lead, or on plunging the steel article into the ladle the lead may overflow into the fire. As we have no pyrometer to measure the heat of the molten lead we must cast around for some substitute that will fairly answer the purpose. An alloy in a small copper tube closed at one end, that has a melting-point at the degree aimed at, is a good means of testing. A wire rod thrust down the copper tube will detect when the alloy melts, as the copper tube is inserted in the molten bath, which, of course, for hardening must be heated to a red. But as the calescence point varies with the grade of steel—i.e., the percentage of carbon content—a number of these copper tubes with different alloys would be needed, as well as a knowledge of the degrees at which calescence occurred. A simple device I have found answer very well, is to hammer out a small rod of the same steel that the article to be hardened is made of—the smaller the better. When the article is in the molten bath, and the heat is being slowly raised, put the steel rod in the bath beside the steel article. When red-hot take it out and quench it; try it with a file. If still soft, raise the heat a little, put in the rod, and quench as before. Repeat this until it hardens, when this happens remove the steel article and quench as quickly as possible. It should result in the best hardness the steel is capable of and our means will allow. It must be remembered that the most skilled workmen have been found, on a test, to be unable to detect red heat within 60 deg. C. up or down.

(To be Continued.)



AN ARTISTIC GATEWAY AT THE ENTRANCE TO A PRIVATE RESIDENCE

cheaper woven, dyed, and mounted on the staff.

I have spoken of pyrometers and electric magnetic furnaces for exactly ascertaining the calescence point of steel and when it is reached in preparing the quenching heat; but, unfortunately, these are so costly, that I expect very few of my readers possess either, and I am in their company, as yet. Well, if we cannot have the rose, let us get as near to it as we can, and I will describe appliances I

only momentarily whilst the thicker parts are being raised only to calescence. But that momentary superheat has coarsened the grains of the steel, in the very place where the maximum of toughness combined with hardness is most needed. The result is a tool that "snips off" at any temper that will maintain the edge, and so the tool is "let down" to a lower color than should be necessary, and the grindstone is in use much more than it should be.



Thoughts on Timely Topics

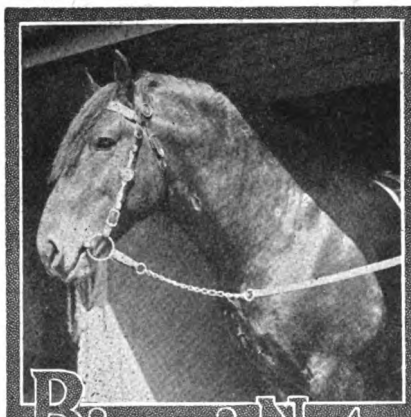
By THORNTON

Caustic Censure and Cheery Comment

"THE AUTOMOBILE," suggests some one, "is a thorn in the side of the smith—what have you to say?" We've had several times and anon raised our fountain pen in regard to the buzz-wagon and joy-cart, but this reader probably wants something slightly different tho' of virtually the same model. The auto is a self-contained substitute for the old-fashioned driving horse, with a multiple lever attachment. It is warranted to eat up space faster than a hungry blacksmith at supper, and is guaranteed to do anything but go when you most want it to. Some say the auto consists of a bit of tin, a coil, a board, a splash of paint and a length of cord; a piece of rubber and several gears; with a spoon of gas it'll run for years. But those who are better informed on the subject and who, by reason of considerable intensive experience, are competent to judge, say that the automobile consists 1-3 of running expense, 7-8 repair expense and the balance is made up of pure old-fashioned mulish cussedness. No auto is perfect, even the salesman will tell you that, but the makers make them as nearly perfect as they can in the time which a clamoring, anxious, waiting public allows the maker to make them. In the old days of the horse it would take an automobile maker several years, working nights and Saturday afternoons, to complete a finished machine when he would immediately start all over again on a new model. But in these days of road-lice and fast production the automobile maker whose factory isn't turning out one and four-fifths cars every tick of the clock except on Sunday mornings, gets hot under the collar and distributes a few more auto jokes to make up the deficiency.

But to resume—the auto is a thorn in the side of the smith and the sooner he gets to working at the thorn the better it's going to be for his business health. The auto will continue to produce a pain in the smith's side just so long as he allows it to do so. He has as much chance of stopping the continuing popularity and use of the auto as a bow-legged girl in a bathing suit has of catching a beau. The auto and truck are here to stay, and the small tractor is coming. And the smith will have to simply accept a continuing, diminishing amount of horse and horse-vehicle work.

The solution? Yes, there is a solution and it is not the mixture sold at the corner wet goods emporium. The thing for the smith, who is not afflicted with stage fright, to do, is to get into the auto-game as opportunity presents. And if he will go at it right his regular smithing trade need not suffer and he will be securing an increasing amount of auto work as his horse and horse-vehicle work slackens. Take for example a couple of good partner-smiths with open brains and common sense that hasn't yet grown to the side of their domes of intelligence. What's to prevent one of of these fellows from working around for six months or a year or even two, in the big city garage and repair shops, getting a good, first hand knowledge of auto repair work and then running the auto repair end of the business? The other partner could easily keep the shop going, hold the trade of the shop and then get his knowledge of the auto end from the other chap. And the auto worker, while learning, would be earning at least something, and altogether this plan would work out with no expense to the smiths concerned and would put them right into the auto game with a good big bunch of sound, practical auto repair information. Is there any reason why this plan should not work out?



The Season's Colt Trotters—The Leading Brood Mares and Their Families—W. J. Andrews, Famous Trainer-Driver, Ill—Disqualified for Crowding.

While there have been no great number of highly sensational colt trotters so far this season there have been a lot of exceptionally good ones, no less than eight yearlings having beaten 2:30, fourteen two-year-olds that have beaten 2:20, and the same number of three-year-olds that have beaten 2:15. Divided into age divisions, these, fastest of the season's baby trotters, are as follows:

Yearlings.

Emma Magowan, by J. Malcolm Forbes, 2:08; dam, Ivollite, by Moko	2:22 1/2
Princess Robey, by The Exponent, 2:11 1/2; dam, Miss Robey, 2:14 1/2; by Paclotus, 2:12 1/2	2:25
Verbena Ansel, by Prince Ansel, 2:20 1/2; dam, Verbena Mac, by Directum Spier, 2:11 1/2	2:26
Una Bingen, by Albingen, 2:18; dam, Lucy Stoner, 2:28 1/2, by Baron Wilkes, 2:18	2:26 1/2
Patsey P, by J. Malcolm Forbes, 2:08; dam, Bessie Hughes, 2:22 1/2, by Stammont, 2:29 1/2	2:27 1/2
Anselot, by Prince Ansel, 2:20 1/2; dam, Lottie Whippleton, 2:15, by San Diego	2:28 1/2
Eloise Worthy, by Morgan Axworthy, 2:17; dam, Eloise, by Wiggins, 2:19 1/2	2:28 1/2
Laba Riddle, by J. Malcolm Forbes, 2:08; dam, by Tregantte, 2:09 1/2	2:30

Two-Year-Olds

Volga, by Peter The Great, 2:07 1/2; dam, Nervolo Belle, by Nervolo, 2:04 1/2	2:09 1/2
Walnut Tree, by Siliko, 2:08 1/2; dam, Markala, 2:18 1/2, by Peter The Great, 2:07 1/2	2:12 1/2
Expressive Lou, by Atlantic Express, 2:08 1/2; dam, Lou Dillon, 1:58 1/2, by Sidney Dillon	2:15
Revelry, by Morgan Axworthy, 2:17; dam, by Empire Wilkes, 2:29 1/2	2:18 1/2
Sis Bingen, by Bingen, 2:06 1/2; dam, Sis Directum, by Directum, 2:05 1/2	2:18
Pagan, by Worthy McKinney, 2:30; dam, Gitana, 2:14 1/2, by Ashbow, 2:29 1/2	2:18 1/2
Setzer Mac, by Henry Setzer, 2:10 1/2; dam, MacCory, 2:28 1/2, by McDongall, 2:10 1/2	2:18 1/2
Colonel Yorke, by Gen. Watts, 2:06 1/2; dam, Brenda Yorke, 2:04 1/2, by Moko	2:18 1/2
Bon Set, by Henry Setzer, 2:10 1/2; dam, Bonnie Way, 2:17 1/2, by Peter The Great, 2:07 1/2	2:18 1/2
Ashland Axworthy, by Axworthy, 2:15 1/2; dam, Graceful McKinney, by McKinney, 2:11 1/2	2:19
Alice Mac, by Azoff, 2:14 1/2; dam, Alice W. B., by Simmons, 2:28	2:19 1/2
Basilla, by Berlim, 2:22 1/2; dam, Ban, by Bingara	2:19 1/2
Peter Allen, by Peter The Great, 2:07 1/2; dam, Bisa, 2:10 1/2, by Bingara	2:19 1/2

Three-Year-Olds

Deroche, by John A. McKerron, 2:04 1/2; dam, Lady Grattan, by Teddy Grattan	2:07 1/2
Mary Putney, by San Francisco, 2:07 3/4; dam, Mendocita, by Mendocino, 2:19 1/2	2:08 1/2
Binland, by Binjolla, 2:17 1/2; dam, Alice Wren, by Ashland Wilkes, 2:17 1/2	2:08 1/2
Rusticoat, by Axworthy, 2:15 1/2; dam, Dorothy T., by Advertiser, 2:15 1/2	2:08 1/2
Vincent Todd, by Jim Todd, 2:08 1/2; dam, Vera Peters, by Peter The Great, 2:07 1/2	2:08 1/2
Native Spirit, by Native King, 2:10 1/2; dam, Great Spirit, 2:11 1/2, by Prodigal, 2:16	2:10 1/2
Red Bingle, by Paronhurst, 2:11 1/2; dam, Josephine Empress, by Red	



Medium, 2:23½ 2:12½
George N. Patterson, by On Voyage,
2:25¼; dam, Yu Tu, by R. Am-
bush, 2:09¼ 2:13¼
Harvette, by The Harvester, 2:01;
dam, Beatrice Bellini, 2:08¼, by
Bellini, 2:13¼ 2:13¼
Miss Latell, by McQuillan, 2:17¼;
dam, Lady Ontell, by Actell,
2:18¼ 2:14
Kerrigan, by Axworthy, 2:15½;
dam, Carrie Kerr, by Prodigal,
2:16 2:14½
Silver Axworthy by Axworthy,
2:15½, dam, Easter Lily W.,
2:06¼, by Oratorio, 2:13 2:14½
Binode, by Bingara, dam, Ka,
2:23½; by Kremlin, 2:07¼ 2:14½

The season has advanced far enough so that those who delight in keeping statistics relating to the standing of the different families may know with a fair degree of certainty how the leading sires will stand both in the male and female lines. The leading brood-mare sires of the year are shown in the following table their new record performers being given, the latter in the parenthesis:

Kremlin, 2:07¼

Ka, 2:23½, (Binode, 2:14½); Kalada, (Berrian, 2:24¼); Kaldah, (Barna, 2:26½); Kalarira, (Blennis, 2:29¼); Kalandi, (Bothnian, 2:20½); Karia, (Basilla, 2:30 and Belgic, 2:21); Karata, (Brissac, 2:15 and Barsac, 2:28½); Katoriah, (Bingona, 2:25½); Komura, (Brillion, 2:22½).

Baron Wilkes, 2:18

Baroness Hanley, 2:25½, (Baron Watts, p., 2:07½); Baroness Marguinte, 2:15¼, (Billy Reller, 2:24½); Baroness Nordeau, (Baroness Aquilin, 2:15¼); Ethel Baron, (Baron Frisco, 2:17¼); Lucy Stoner, 2:28¼, (Una Bingen, 2:26¼); Minnie Wilkes, (Great Minnie, 2:21); Miss Flashlight, (Ned Patch, 2:26½); Sister Alice, 2:10½, (Sis Bingen, 2:18 and Marshall McKinney, 2:20¼); Wilcaletta, (Lady Pollyanna, 2:25¼).

Moko

Brenda Yorke, 2:04½, (Colonel Yorke, 2:18¼); Daisy Wilkes, (Moko Hall, 2:10); Driftlett McGregor, 2:22¼, (Lettie Hall, 2:10); Ella Moko, (Jean Wotan, 2:25); Ivolette, (Emma Magowan, 2:22½); Little Lovejoy, (Sym Moko, 2:19¼); My Fancy, (Fancy Hall, 2:24¼); Notelet, (Harvest Hope, 2:21½); Sylvia Moko, (Rovena Worthy, 2:24).

Axtell, 2:12

Annetell, 2:20½, (Grattell, 2:25¼); Avleona, Betty Allis, 2:26½; Hazel Axtell, (Axreaper, p., 2:17¼); Marguerite A., (Mr. Work, 2:27¼ and St. Margaret, 2:19¼); Milady Axtell, (Saskie, 2:29); Miss Axtell, (Great Governor, 2:19½); Sistelletta, (Fred Moran, 2:28¼); Unnamed mare, (Axtell Bingen, 2:24¼).

Bingara

Ban, (Basilla, 2:19¼); Barella, (Sangaree, 2:28); Belvasia, 2:20½, (Hollywood King, 2:17¼); Berta, 2:25¼, (Bertron, 2:23); Bisa, 2:10¼, (Peter Allen, 2:19¼ and Colorado B., 2:25½).

Peter The Great

Bonnie Way, 2:17¼, (Bon Set, 2:18¼); Cyarevna, 2:07¼, (Czavada, 2:18¼); Lady Caleta, 2:15¼, (Peter Worthy, p., 2:19½); Markala, 2:18½, (Walnut Tree, 2:12¼); Tinlight Maiden, (The Gloaming, 2:24½); Vera Peters, (Vincent Todd, 2:08¼).

Prodigal, 2:16

Carpet, 2:28, (Lowell Axworthy, 2:21½); Carrie Kerr, (Kerrigan, 2:14¼); Eirirange, 2:21, (Colorado Range, 2:09½); Great Spirit, 2:11¼, (Leading Spirit, 2:10¼);

Rena Prodigal, 2:29½, (Janos, 2:23¼).

Expedition, 2:15¼

Chaperone, 2:27¼, (Morning Gossip, 2:19½); Elsie Leyburn, 2:27¼, (Simony, 2:26¼); Gladys, (Polly Danvers, 2:18¼); Winter, 2:14¼, (Mintmark, 2:27); Priesa, (Peter De Forest, p., 2:20½).

Arion, 2:07¼

Bertha Leyburn, 2:17, (Maple Tree, 2:21¼); Lady Arion, 2:19¼, (Lotta Watts, 2:22¼); Palm Bearer, (Blade, 2:28¼); Pecoleta, (David Bingen, 2:28).



THE IRON CROWN OF ITALY AND FAMILY SHIELD OUTSIDE THE PALACE AT FIREUZE

Simmons, 2:28

Alice W. B., (Alice Mac, 2:19½); Free Fancy, (Velveola, 2:26); Helen Simmons, 2:11½, (Spriggun, 2:08¼ and Barbara King, 2:15¼); Miss Agar, (Fontilla, 2:24¼).

Allerton, 2:09¼

Blondell Pollock, (Winiola, 2:29¼); Indale, Zola Belle, 2:25¼; Viola Dale, (Davola, 2:24¼).

Chimes

Axalia, (Hawoda Creek, 2:23½); Chime Bill, 2:00¼, (Belle Chimes, 2:17¼); Future Princess Ideal, (The Future, 2:28½).

Guy Wilkes, 2:15¼

Adioo, (Adioo Guy, p., 2:17¼); Lindora Wilkes, (Guy Crescens, 2:17¼); Madam Thompson, (The Pierette, 2:14¼).

Onward, 2:25¼

Croppy, (Faralie, 2:29¼); Maggie Onward, (Morizorie, 2:20½); Oriana, 2:19¼, (The Vladimir, 2:20¼).

Parole, 2:16

Baroness Honor, (The Index, 2:23); Cabinet's Honor, 2:30, (The Stroller, 2:16¼); Protien Parole (The Warrant, 2:27¼).

Walnut Hall, 2:08¼

Lady Fostyn (Edgarton, p., 2:20); Linka Hall, (Azie Hall, 2:27); Verona Hall, (San Verona, 2:20).

The famous trainer and driver, W. J. Andrews, who for more than twenty years has been a most prominent figure in Grand Circuit racing was stricken with the heat during the Circuit meeting at Syracuse last month and at this writing is in a condition so serious that there are doubts as to his recovery. No man among the noted race drivers is better known or has more friends among the race goers than this gentlemanly Western New York man. He made his debut in the big ring races about twenty-five years ago, when he was in the employ of the late C. J. Hamlin, of Buffalo, and with Belle Hamlin, 2:12¼, Prince Regent, 2:16½, Wardwell, 2:14½ and other stars of that period he demonstrated himself a reinsman of rare skill and a race general of unusual ability. After leaving the employ of Mr. Hamlin, Andrews was soon in the limelight with the pacer Mascot, that he drove to the world's record of 2:04. A few years later he had another world's champion in the pacing stallion John R. Gentry that he drove to a record of 2:00½, and won, with that horse some of the most notable match races ever raced. He trained for a time at the Empire City Farms, owned by William Simpson of New York and then for some three years he trained the horses of the late E. H. Harriman, and brought out some notable performers for both men. Then some four or five years ago he brought out the noted trotting mare, Hamburg Belle, whose race record of 2:21, is still a world's record and the race he drove her against the present trotting champion Uhlan, 1:58 has generally been called the finest exhibition of reinsmanship and generalship ever seen on a race track although there are some expert judges of racing form, who are of the opinion that even that superb exhibition was surpassed by Mr. Andrews in August of this year at North Randall, Ohio, where with Leo Axworthy he defeated the hitherto undefeated colt, Peter Volo, the race being the fastest ever trotted by a stallion. Mr. Andrews also had in his stable this year another sensational trotter (the two-year-old filly, Volga, that has already taken a record of 2:09¼, and that her trainer and many other good judges regard as the most wonderful trotter the turf has known. A few days before Mr. Andrews was stricken he stated that he was certain that he could drive this great two-year-old in 2:06 and that he believed that she would eventually prove to be the world's fastest trotter if she was not incapacitated by sickness or accident. Everyone who knows Andrews will hope that he will be able to resume his work in the sulky next year for his permanent absence from the aggregation of trainers known as "the Big Six", would be a distinct loss to the light harness racing interests.

That was an encouraging action which the judges of the Grand Circuit meeting at Hartford, took when they disqualified the driver of the pacer Judge Ormonde, 2:03¾ for foul driving, after the horse had won two heats of the race. In the race in question the driver of Judge Ormonde crowded the veteran trainer "Pop" Geers, who was driving Russell Boy, well towards the outside fence, and in plain view of the judges. There has been too much of such kind of driving and the judges have two generally overlooked it for the good of the sport and the severe punishment meted out to the offending driver at Hartford may serve as a warning.



A Wish

(Author Unknown.)

I wish I was a rock
A-sittin' on a hill,
A-doin' nothin' all day long
But just a-sittin' still..

I wouldn't sleep,
I wouldn't eat,
I wouldn't even wash.

I'd just sit still a thousand years
And rest myself, b' gosh.



Heats, Sparks, Welds

The purse can't get fat on lean collections.

Hammer on collections as well as on the anvil.

Some smiths seem to think that overhead is something to be overlooked.

It's as hard to drown your troubles in drink as to quench fire with gasoline.

The largest bank account is not always owned by the loudest talking customer.

Better be a "customer satisfier" than a "customer pacifier". Service will do it.

You can fatten profits without padding selling costs by tightening up on losses and expense.

Are you profiting on the figures you quote on your work? Are you figuring on a working profit?

Every man has some ambition. Why even the tramp and hobo are ambitions to live without work.

There's a speed limit which it is not well to exceed either on the road to success or the road to ruin.

If your scrap pile were an indicator what would it say? Look at your scrap pile as if you were a stranger.

A drop in price when costs go up because competitors drop usually means a drop out of sight for someone.

Quality is the best partner that Price can have and only when the two go hand-in-hand may a re-order be expected.

It's a poor smith who will try to sell poor work at a poor price—and usually it's the poor craft that suffers most.

Trying to fool people with price arguments is about as sensible as dropping a letter without a stamp into the mail box. It will be found out.

A kind soft-toned firm voice will accomplish more with the horse than a harsh, rough, loud one. And isn't the same true with relation to children and men?

The Pink Buffalo Stamps are still working. Don't fail to use them freely. If your supply is low—ask for a herd of Buffaloes now.

When costs begin to fatten pad your selling prices in proportion. Don't attempt to absorb the extra costs in your already too lean profit.

Wouldn't whitewashed walls lighten labors during the closed-door season? Try it and see how much brighter and more cheerful the shop can be made.

"The man that trots his horse uphill on a hot day is generally the one who's children hide behind their mother when he comes in the house "ses Ol' Sam Hill.

"Never too early to mend" is better than the old-time-worn "never too late—" and then too it is more likely to keep the holes in the roof from getting larger.

What have the past ten years done for the craft? What will the next ten bring forth? Think about these questions and see if the past tells anything of the future.

Which is easier? To keep a horse in good condition or to build him up after he has lost his strength. Now apply the same reasoning to business and then work accordingly.

A good many of "Our Folks" have ordered "Square Dealing" mottoes—don't hold off too long with your order. They're cheap, they're good and may help on the collection end.

"Just to keep busy" is not sufficient excuse for accepting a cut price even in slack time. Remember, the less work the greater the proportion of overhead each job must carry.

When the get-rich-quick artist gets busy in his loud-voiced way and tells you of the great and grand possibilities of his little scheme, listen if you want to—but, keep a firm hand on your wallet.

If you have cultivated the acquaintance of the man who cultivates the soil when he was a cultivator, you should "harvest" his bill when he does his harvesting. A little bill harvesting is right in order now.

Side-lines pay when you work them right. That doesn't mean neglect of the main line. The closer a side-line works to the main line the better and the more unlikely it is to interfere with the regular business.

Some men are so busy that they accomplish nothing while others with apparent ease seem to do a tremendous amount of work. Why? It's the difference between fussing and working—between inefficiency and efficiency—between Tom Tardy and Thornton.

It's not so much the source of knowledge as the knowledge itself that counts. The right kind of man is willing to learn from a ten-year-old if the youngster really knows something the man does not. The important thing is the knowledge itself not its source.

Pluck will lead a man more quickly to success than luck ever can hope to, yet some men excuse the actions of the successful by crying: "Luck." Pluck has plucked more laurels in the past century than ever dropped into the lap of luck since the beginning of time.

TRUE TALES OF OUR SERVICE Number Eleven.

A Texas smith in the market for a list of new shop equipment, saw staring him in the face the laborous and time consuming task of writing letters to a long list of supply houses and manufacturers. He asked us if we could help him. He gave us a list of the machines and items of equipment which he wanted and we put him in touch with more firms than he knew or ever heard about. He wrote one letter, but received scores from dealers and makers.

It's well to be satisfied in some ways, but when a man is satisfied with all things as he finds them he's not likely to make much progress in this world. Enough dissatisfaction to promote an incentive to better things should be the portion of every normal being.

Length of service may mean little or much. There's our friend Tom Tardy for example—he's had an experience long enough to know pretty near all there is to smithing and—he thinks he does, but a five minute call at his shop, when he's working will show that his experience is about as broad as a cow path.

The importance of some ideas can only be rated by their work for humanity when given to the world. The ideas that have rotted and rusted in the brains that created them never did anyone any good. If you are getting real help out of these pages, send in some of your own ideas and let others profit from your knowledge and experience.

NOW—NOW—NOW—right now is the time to get after the toiling son of the soil and get him to "settle up." Don't let the money he owes you go into any more automobile equipment without a protest. Get busy and collect. The way to make collections good is to collect. You can't do it by sitting in the shop and thinking about it. He's got the money now or should have. And you cannot get yours unless you go after it.

TWO STATE CONVENTIONS

President Perry R. Buckley of the Kansas Blacksmiths', Horseshoers' and Wagonmakers' Association invites every craftsman of Kansas to the State convention to be held at Independence, November 10th and 11th. Plans are laid for one of the best meetings in the history of the association and many things of vitat interest o every Kansas smith will be taken up. Independence is a convention city and is going to make the occasion one of pleasure and profit. Don't miss this convention. President Buckley expects every Kansan who can possible arrange to be there.

Secretary F. E. Pomeroy of the Blacksmiths', Horseshoers', and Wagonmakers' Association of Oklahoma announces the convention at Oklahoma City on November 15th and 16th and invites every blacksmith and automobile mechanic to attend, whether a member of the association or not. This will be a most important meeting. The Oklahoma Association is in better shape to go ahead and accomplish the things it desires and all that is needed is a good strong pull together. Don't forget the date and place.



Our Honor Roll

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G. F. Laughlin, Ill.....	Dec., 1918
L. M. Platt, Penn.....	Dec., 1918
F. Boeckman, Ill.....	Dec., 1918
W. H. Habermehl, Iowa.....	Dec., 1918
E. T. Marshall, Wis.....	Dec., 1918
F. Hoopengardner, Md.....	Dec., 1918
Hebrew Tech. Inst., N. Y.....	Dec., 1918
G. E. Winchester, Calif.....	Dec., 1918
F. T. Grisham, Ark.....	Dec., 1918
J. Gray, Scotland.....	Dec., 1918
W. J. Morris, Queens Aust.....	Nov., 1918
W. Tait, New Zealand.....	Nov., 1918
A. Larsen, New Zealand.....	Nov., 1918
R. E. Russell & Son, Penn.....	Nov., 1918
H. Schaffer, South Dakota.....	Nov., 1918
D. MacDonald, N. S. Wales.....	Nov., 1918
C. A. Ritchie, Scotland.....	Nov., 1918
T. E. Sanders, England.....	Nov., 1918
G. E. Hardcastle, N. Y.....	Nov., 1918
C. Ziehe, Iowa.....	Nov., 1918
J. L. Pfeffer, Penn.....	Nov., 1918
W. H. Houghton, Penn.....	Nov., 1918
F. R. Tomlinson, Kansas.....	Nov., 1918
F. A. Rhea, Ill.....	Nov., 1918
C. A. Bouvoulouir, Ill.....	Nov., 1918
H. V. Ruehl, Ala.....	Nov., 1918
Cyclone Gate & Fence Co., South Africa.....	Oct., 1918
W. Alson, Minn.....	Oct., 1918
H. P. Bowerman, N. D.....	Oct., 1918
P. Dererney, Viet.....	Oct., 1918
H. C. Henderson, Queens.....	Oct., 1918
J. Eley & Sons, S. Australia.....	Oct., 1918
J. E. Matthews, England.....	Oct., 1918
Munro & Co., New Zealand.....	Oct., 1918
D. R. Winton, N. S. Wales.....	Oct., 1918
E. Scrapel, S. Australia.....	Oct., 1918
W. W. Davis, Okla.....	Oct., 1918
H. B. Farthing, Sask, Canada.....	Oct., 1918
N. B. Peavey, N. H.....	Oct., 1918
J. B. Hayden, Ohio.....	Sept., 1918
Platt & Braman, Minn.....	Sept., 1918
C. Madison, Ill.....	Sept., 1918
A. Quay, South Africa.....	Sept., 1918
J. Wilkinson, Queens.....	Sept., 1918
Grimeley, Ltd., N. S. Wales.....	Sept., 1918
C. E. Birely, Md.....	Sept., 1918
J. F. Baggett, Queens.....	Sept., 1918
J. Thorneycroft, N. W. Ter.....	Sept., 1918
W. A. Thege, Queens.....	Sept., 1918
A. L. Varrie, South Africa.....	Sept., 1918
George A. Petty, Utah.....	Sept., 1918
G. W. Hazlett, Penna.....	Sept., 1918
C. Walker, Ore.....	Sept., 1918
T. B. Holt, Okla.....	Sept., 1918
Robert Cook, Ky.....	Sept., 1918
A. B. Wendlandt, Wash.....	Sept., 1918
A. J. Brookman & Co., Viet.....	Sept., 1918
Peter Cocks, W. Australia.....	Sept., 1918
R. J. Tompkins, Texas.....	Sept., 1918
H. K. Ginn, Maine.....	Sept., 1918
A. H. Morrill, Mass.....	Aug., 1918
L. Cooper, Ohio.....	Aug., 1918
T. W. Johns, Garman's Mills, Md.....	Aug., 1918
E. H. R. Scholz, S. Australia.....	Aug., 1918
J. Vaschetti, Colo.....	Aug., 1918
E. C. Puxton, S. Australia.....	Aug., 1918
V. D. Sibley, B. C.....	Aug., 1918
L. Smith, Calif.....	Aug., 1918
W. Cribb, Queensland.....	Aug., 1918
George Deed, South Africa.....	Aug., 1918
H. Kelenbons, N. J.....	Aug., 1918
W. D. Bradford, Calif.....	Aug., 1918
J. Meyn, Ill.....	Aug., 1918
M. Anderson, S. D.....	Aug., 1918
J. A. Lundquist, Ill.....	Aug., 1918
O. Smith, Penna.....	July, 1918
E. K. Sayles, Penna.....	July, 1918
G. W. Doty, Penna.....	July, 1918
C. E. Frazier, Ky.....	July, 1918
L. C. Withamp, Mo.....	July, 1918
T. H. Graham, Victoria, Aust.....	July, 1918
E. A. Winkler, Penna.....	July, 1918
J. A. West, Kansas.....	July, 1918
Gilbert Bros., South Australia.....	July, 1918
George Dash, New Zealand.....	July, 1918
C. R. Oliver, South Africa.....	July, 1918
L. G. Reid, South Africa.....	July, 1918
J. M. Kunzier, N. J.....	July, 1918
Polzer Bros, Wis.....	July, 1918



Woodworker

How to Build a Box Sleigh

R. H. LOMAS

"Work"

The most useful pattern of Canadian sleigh for general purposes is one with a plain box body and removable seats, suitable for both pleasure and light business purposes.

Fig. 1 is a side elevation of such a vehicle with two deep lazy-backed seats accommodating four passengers, and suitable for either one or a pair of horses. Fig. 2 is a half front view, showing the side bend of the runner meeting the dash iron in one continuous sweep, also the position of the forked shaft eye. Fig. 3 is a

one slid farther back when used by two occupants only.

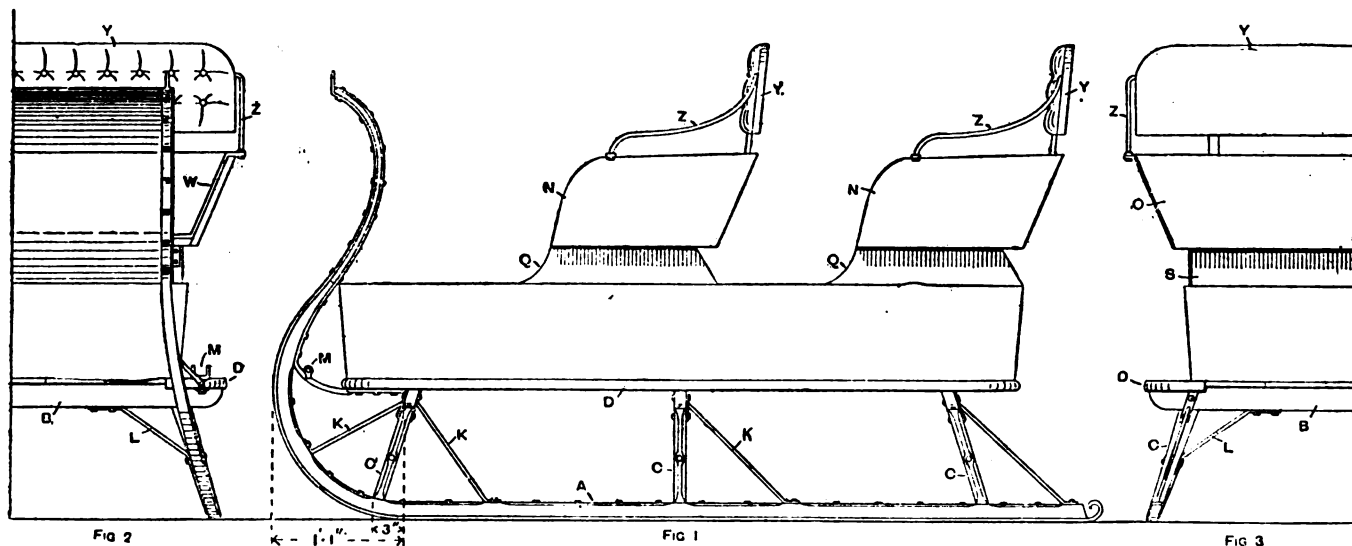
The principal dimensions are as follow: Size of body on top line, 5 ft. 8 in. by 2 ft. 11 $\frac{1}{4}$ in.; depth of body panels, 9 $\frac{1}{2}$ in.; sides and ends of body splayed $\frac{3}{4}$ in.; height from bottom boards to top of seat, 1 ft. 2 in.; seat boards, 3 ft. by 1 ft. 4 in.; depth of seat panels, measured on a vertical line, 9 in. at front and 9 $\frac{1}{2}$ in. at back; sides and back of seats splayed 4 in.; depth of lazy back, 9 in.; distance between lazy back and top of seat panel, 2 in.; distance of front seat from front of body, 1 ft. 9 in.; length of runners over the bend, 6 ft.; width of track over runners, 3 ft. 6 in.; height from ground line to top of rave, 1 ft. 2 in.; height of dash from top of body, 1 ft. 8 in.; and width of dash, 2 ft. 8 in.

The runners A (Fig. 1), the beams B, and the knees C (Figs. 1 to 4) should be of fine white oak, the runner 1 $\frac{3}{8}$ in. deep by 1 $\frac{1}{8}$ in. thick, beams 3 ft. 6 in. long by 2 $\frac{1}{4}$ in. deep by 1 $\frac{1}{8}$ in. thick, and the knees 1 $\frac{3}{4}$ in. wide at the beam, tapering to 1 $\frac{1}{8}$ in. at the runner by 1 $\frac{1}{8}$ in. thick. The front ends of the runners terminate at the upper edge of the body, where they taper to the thickness of the dash-board; and when ordering,

beam projecting 3 in. Do not weaken the runners by mortising right through, but leave $\frac{3}{8}$ in. of wood underneath, and make the mortices a little wider at the bottom than at the top to allow for wedging. Having cut all the tenons, set up the knees and beams, and lay them together to see that the tenons are all in line. Next put on the runners, and test for accuracy, correcting all joints. Then, after marking all the bearings, take the frame apart and shave up the edges, leaving the back of the knees flat.

Glue up the knees and beams, and when the glue is set, give the tenons at the lower end of the knees a coat of white-lead mixed with raw linseed oil, insert a small wedge in the end of each, and drive them into the mortices in the runners. Place the runners between timbers fixed to the floor of the shop, forming parallel grooves the required distance apart for the width of track, and that the beams are in the exact position in which they are to remain, and fix them with cleats.

The raves or running boards D (Figs. 1 to 4) and the bottom boards E may be of oak. The raves are 5 ft. 7 $\frac{1}{2}$ in. long by 6 in. wide by 1 in. thick. Let them into the beams $\frac{3}{8}$



FIGS.—1-2-3; SHOWING SIDE ELEVATION OF SLEIGH AND HALF-FRONT VIEW AND ALSO A HALF-BACK VIEW

half back view, from which the various side bevels and half widths are obtained, and showing one of the side raves or running boards, which serve as a step when entering and alighting. Fig. 4 is a half plan, bottom upwards.

The body is made deep to afford protection to the feet, and not too long to be ungainly in appearance when only one seat is used, the hind seat being taken out and the front

have them bent with the end-grain or annual rings vertical.

In framing up the under-work, set the foot of the front knee 3 in. in advance of the beginning of the bend of the runner, and the beam 6 in. from the front of the body. Set the back beam 6 in. from the back of the body to the same angle as the front knee. Tenon the knees into the beams and runners to the required bevel as shown by Fig. 5, the ends of the

in., with the outer edge projecting $\frac{1}{2}$ in. over the ends of the beams, and fix them with screws. Fill in the space between the raves with $\frac{5}{8}$ in. boards lengthwise of the frame for the floor, nailing them to the beams.

If the sleigh is to be painted, whitewood will be suitable for the panels and dashboard. A longitudinal sectional elevation of the body is given by Fig. 6, the frame of which is of ash 9 in. high, the panels



extending $\frac{1}{2}$ in. above to form a guard for the seat risers. As the panels are $\frac{1}{2}$ in. thick, the frame should be made 1 in. less in length and width than the dimensions previously given. The rails F, sills G, and standards H are all $\frac{7}{8}$ in. by $\frac{7}{8}$ in., while the corner pillars are $1\frac{1}{8}$ in. by $\frac{7}{8}$ in. A standard is also framed in at the centre of the front and back of the frame. Fig. 7 is an enlarged plan of the corner joints. The standards are half-lapped into the rails and sills from the outside, the joints being glued and screwed together. Mitre the panels together

the front end of the rails, and the other to the back of the runners with bolts. The runners are shod with soft cast-steel shoes, $1\frac{1}{8}$ in. wide on the top and 1 in. on the tread by $\frac{3}{8}$ in. thick, fixed with $\frac{1}{4}$ -in. bolts with countersunk heads. The shoes are lapped into the front plates, of 1-in. by $\frac{3}{8}$ -in. half-round iron, which continue to the top of the dash, terminating in a spill at the end. There is a similar plate at the back of the dash, lower end of which is lapped into the upper end of the shaft-eye flap, the dash-board, of $\frac{1}{2}$ -in. wood, being fixed between the two plates

neath the seats with screws, the front rails, R, of 2-in. by $\frac{3}{4}$ -in. ash, being checked and screwed into the front ends of the risers as shown by the enlarged view (Fig. 10).

The space between the back seat and the body is closed in with a $\frac{3}{8}$ -in. panel, S, boxed into the back ends of the seat risers, and a fillet, T, is fixed on inside underneath the seat. The space below the front seat is closed in by a $\frac{3}{4}$ -in. board, U, stumptoned and glued into the risers, and a $\frac{5}{8}$ -in. removable board, V, secured in position with a couple of studs at the bottom, and two small

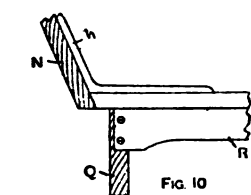


FIG. 10

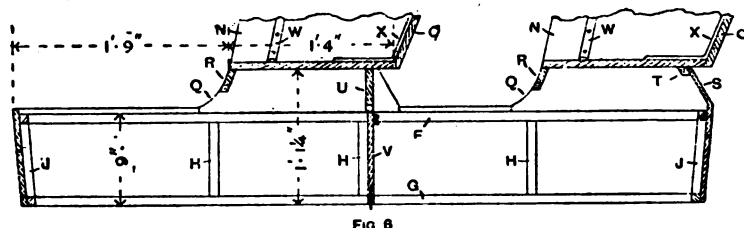


FIG. 6

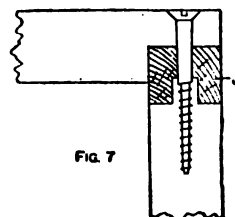


FIG. 7

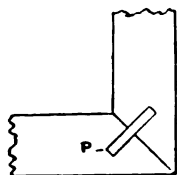


FIG. 9

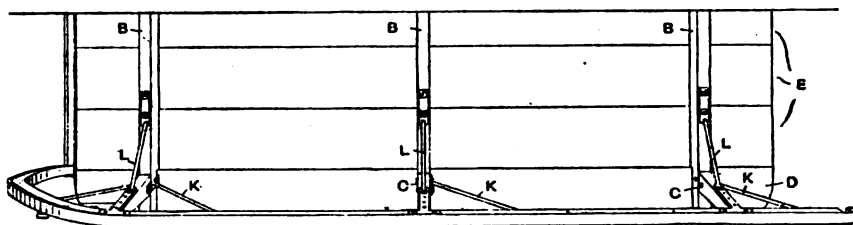


FIG. 4



FIG. 8

DETAILS OF SLEIGH: FIG. 4—HALF PLAN VIEW FROM BELOW. FIG. 6—LONGITUDINAL SECTIONAL ELEVATION OF BODY. FIG. 7—CORNER JOINT OF FRAME. FIG. 8—T-IRONS FOR RUNNER AND KNEE JOINTS. FIG. 9—CORNER JOINT OF SEAT PANELS. FIG. 10—DETAIL OF FRONT OF SEAT

at the ends, then fix them to the frame with glue and brads, and punch the latter well below the surface. Then dress the face of the panels slightly convex (otherwise they will appear hollow when painted and varnished), and fix on the corner plates. The lower corners of the frame should be strengthened with knee plates. If it is intended to have the body removable, it can be fixed to the rails with light bolts and wingnuts; but if not, it can be fixed with screws put in from underneath.

The runners can now be removed from their fixings, and the ironing-up of the underwork proceeded with. The flaps at the top of the side braces K (Fig. 1) are each fixed with a couple of light bolts put through the knees and beams, making the joints secure. The runners are further secured to the knees with T-irons (Fig. 8), which may either be welded or lapped into the lower flap of the under-braces L (Figs. 2, 3, and 4). The forked shaft eyes M (Figs. 1 and 2) have a flap at both ends, one fixed underneath

with $\frac{1}{4}$ -in. bolts. The dash-board can be bent to shape by wetting or steaming the back, and subjecting the face to heat.

Next take the seats in hand. Dress off the three bevelled edges of the seat boards the required amount, as indicated in Figs. 1, 2, and 3; but narrow the back of the board 3-16 in. on each end. This is done to ensure the width at the top of the end panels measuring across front and back alike, which they will not do otherwise if the front corner is lower than the back. The seat panels, N and O, are of $\frac{3}{4}$ -in. whitewood, are mitred at the back corners and screwed to the edges of the seat board. With a coarses aw, run a slot in the corner joint as shown at P in Fig. 9. Glue and screw the panels in position, secure the top of the joints with corner cramps, and drive into the slot a glued strip of ash. When the glue is set, dress off level, and secure the joints with corner plates on the top. The seat risers, Q (Figs. 1 and 6), should be of $\frac{7}{8}$ -in. close-grained hard wood, such as cherry. They are fixed under-

neath the seats with screws, the front rails, R, of 2-in. by $\frac{3}{4}$ -in. ash, being checked and screwed into the front ends of the risers as shown by the enlarged view (Fig. 10). The space between the back seat and the body is closed in with a $\frac{3}{8}$ -in. panel, S, boxed into the back ends of the seat risers, and a fillet, T, is fixed on inside underneath the seat. The space below the front seat is closed in by a $\frac{3}{4}$ -in. board, U, stumptoned and glued into the risers, and a $\frac{5}{8}$ -in. removable board, V, secured in position with a couple of studs at the bottom, and two small

brass bolts at the top, on each side of the body. Hoop-iron should be fixed along the top of the side rails, F, for the seat risers to slide on, the risers having studs fixed underneath registering with holes in the plates and rails to hold the seats in position. The lower part of the seat irons is shown at W and X (Fig. 6). They are 1-in. by $\frac{3}{8}$ -in. half-round iron. The lazy-backs, Y, (Figs. 1, 2 and 3) are fixed with screws to the back irons, X, and the side stays, Z, the threaded pin at the front end of the stay passing through a hole in the top end of the front irons, W, a nut being screwed on underneath. The shafts or thills are of the buggy type, bent downwards at the heel, the size chosen being suitable for a 15-hands horse. Fig. 11 is a side view of the shafts, Fig. 12 a front view, and Fig. 13 a plan of the under-side. The best kind of wood for the shafts and bars is hickory. The dimensions of the shafts are as follows: Length from cross-bar to point, 6 ft.; distance from cross-bar to tug-stop, 4 ft. $6\frac{1}{2}$ in.; distance from cross-bar to back

screw hole of breeching staple, 2 ft. 3 1/2 in.; width between the shafts, 3 ft. at the bar and 2 ft. 1 in. at the tugs. At the cross-bar the shafts are 1 7/8 in. wide by 1 1/2 in. thick, and the cross-bar, 2 in. by 1 1/2 in., is framed into them with tenons 1 in. long. The back parts of the shafts are strengthened with 1 1/2-in. by 3/8-in. half-round plates, A, fixed underneath the bolts and screws, the end bolt next to the eye having a T-head clipped round the sides of the shaft to prevent its splitting. The bar plate, B, of 1 1/2-in. by 3/8-in. half-round iron, has a boss in the centre to take the whiffletree bolt, the ends of the plate being welded into the shaft plates. Light braces, C, are fixed to the inner edge of the shafts and cross-bar for additional security.

The whiffletree, D, is 2 in. by 1 1/2 in. at the centre, tapering to 1 1/4 in. by 3/8 in. at the ends, which pass through the slotted holes in the end of the traces, the latter being kept in position by pieces of leather lace put through two small holes bored through the whiffletree as shown at E (Fig. 12).

Melting, Moulding and Casting in the Smith Shop

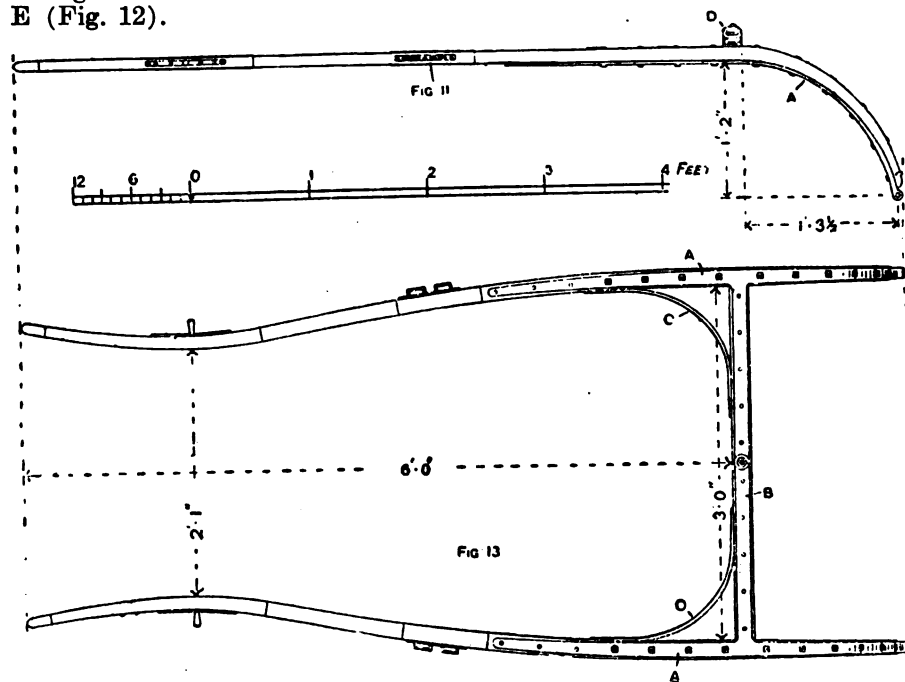
W. J. MAY, "English Mechanic."

As a general thing, all metals and alloys having a pouring temperature of under 1,000 deg. Fahr., can be melted on an open fire, while beyond this, and up to roughly 2,000 deg. Fahr., a roughly-constructed brick furnace on a forge will be needed, as some form of blast will be necessary in the absence of a properly-constructed natural draught crucible furnace. Hard gas-coke can be used, but it is preferable to have proper furnace-coke where blast is used; this of one brand or other generally being obtainable from coal merchants in ton lots, or where there is a foundry being supplied, smaller lots can usually be secured. Not larger than 30 lb. plumbago crucibles should be used—as a rule, clay crucibles cannot be cooled with safety—but probably 20 lb. crucibles would be large enough for anything an amateur would take in hand.

in regard to molten metal time cannot be wasted.

Whether the forge be a fixed or portable one, the ashes should be levelled, and a piece of pipe embedded to lead the blast to the centre of the improvised furnace, as shown in Fig. 1, the ashes being well damped and made firm. Firebricks put together dry are preferable, but any well-shaped bricks can be used. Where a moderate blast can be secured from any source—not necessarily from a forge—the same arrangement modified to meet the prevailing conditions can be used, while in some cases the bricks can be put together with fire clay or other material provision being, of course, made for the removal of ashes.

If there is a chimney of from 17 feet to 20 feet or more high, which can be made available, a built furnace for purifying the ash would be sufficient. Such a furnace would melt iron, and in some instances, would be very useful; but, being fixed, it would not be removable when melting ceased, and



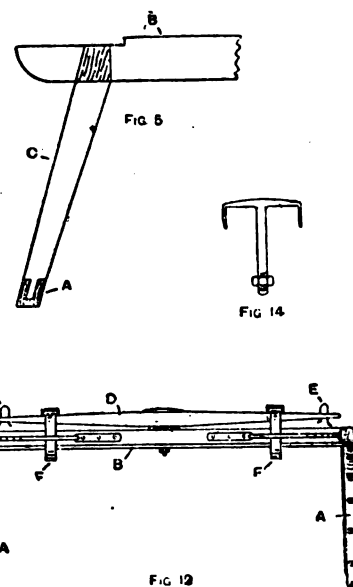
DETAILS OF SLEIGH—FIG. 5—KNEE JOINTS. FIG. 11—SIDE VIEW OF SHAFTS. FIG. 12—FRONT VIEW OF SHAFTS. FIG. 13—PLAN OF UNDERSIDE OF SHAFTS. FIG. 14—SWIVEL BOLT FOR WHIFFLETREES

The swivel bolt (Fig. 14) is 1/2 in. in diameter, and has a T-head with fangs at the ends to drive into the whiffletree. Washer-plates are interposed between the cross-bar and whiffletree, to which they are fixed with screws. The bolt passes through the centre of the bars, and is secured with a hexagon nut and a split-pin underneath. A couple of leather check straps, F, hang loosely round the two bars near the ends.

Proper flasks would be necessary but these could be home-made, with wooden sides and ends, if iron corners were provided. Sand would, perhaps, prove difficult to obtain in some places, although if one had a ton lot the trouble would be less. Tools are not difficult to obtain, and generally speaking, only a few would be needed. Many makeshifts can be made, as time is not so great an object as in a large foundry; but

for this reason possibly such a furnace could not be made available in every place.

Whatever form of heating is adopted, it must be able to provide that the fuel is burnt to the best advantage, and that the crucibles shall be adequately heated during the melting period. Too prolonged heating at a low temperature causes a quite unnecessary amount of oxidation, while prolonged heating at too





high a temperature causes the molten metal to become "burnt", in which state it cannot produce sound castings, as the metal becomes full

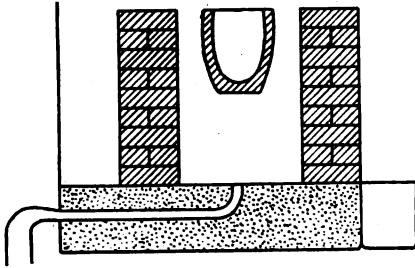


FIG. 1.—SHOWING DIAGRAM OF ONE STYLE OF FURNACE

of occluded oxides. The object aimed at in all melting should be to bring the metal into as fluid a molten state as possible in as short a time as can be reasonably managed, making due allowance for the difference in time taken to absorb heat, and then to pour at once when the proper stage is reached, any surplus left after pouring the moulds being poured into bars in open sand or other open moulds for remelting.

The method of melting is to light a small fire in the furnace with wood and coke, and when the coke is well kindled, the crucible is placed in position and packed round with coke free from dust. Usually one charge of coke is sufficient to melt brass; but with some metals having a higher melting temperature additional fuel is necessary when the first charge is about half-consumed. Tongs are needed for handling the crucibles; bowed coke-tongs, as shown in Fig. 3, being sufficient for lifting and pouring up to 20 lb. crucibles, while larger sizes require crucible tongs, as shown in Fig. 4. Over about 20 lb. crucibles a bail or ring is desirable for pouring, this being shown in Fig. 5, two persons being necessary to use this. The tongs and ring must fit the crucibles, or these will soon be destroyed, and considerable expense will be incurred when this is the case.

Crucibles.

These should be of the plain, upright form, and should be of one size, according to the work which it is intended should be carried on. Plumbago crucibles must be kept dry, and in a fairly warm place, and if care is taken to empty them each time they are used they will, with ordinary careful usage, give from thirty to fifty meltings before they fail, while with some metals anywhere up to a hundred meltings can be secured; but such good results cannot be expected where inexper-

iented melters are concerned. Clay pots, although very much cheaper than plumbago, are less useful for general work, because they cannot be cooled off with any degree of safety, it being necessary to get them back into the fire as soon as poured. Carefully heated at first, two or three meltings in close succession is about all that can be depended on with clay crucibles; but, no doubt, they fill a want. Where only one melting is needed, clay pots will do very well as a general thing; but, in any case, they are not very much to depend on, and if at all damp, they break at once when strongly heated.

Flasks or Boxes.

As most persons who have been in a foundry know, the moulds are either wholly made in flasks, or partly in the sand floor and partly in the cope or top half of a flask; but for small work in any metal

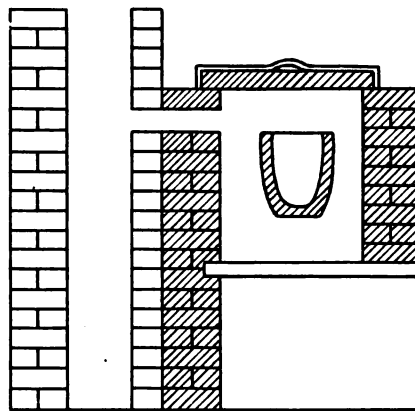


FIG. 2.—ANOTHER STYLE OF MELTING FURNACE

moulded in sand the whole of the work is done in flasks, usually only two-part being necessary, but occasionally for special jobs multiple-part flasks are used. For such work as is at present being considered, two-part flasks only are required, and these may be of metal, or of wood with metal corners and fittings. Wooden flasks may very well be home-made, the corners being of 1/8-in. iron plate, and the handles and pin-brackets of the same material. As probably no casting of any size will be attempted, flasks about 15 inches to 18 inches long, and about 8 inches deep, will be large enough; but the exact size will depend on requirements. For instance, the writer at one time used flasks 10 inches square and 6 inches deep for a particular class of work, and found them to give a better return than larger ones; but obviously such flasks would not take anything more than about 7 inches across. Roughly,

the size previously given would be most useful for a beginner; but the size of the castings determines the flask sizes, because you cannot make a casting with the ends sticking out of the ends of the flask. Besides the flasks, boards slightly larger than the square of the flask, are needed, and where end-pouring is adopted, clamps will be necessary to hold the flask parts together. In pouring from the top of the flask, weights only are required; these, of course, exceeding the weight of the metal poured. The weights should be long enough to reach across the flask, or otherwise the corners should be weighted down, the object being to prevent the cope rising from the drag when the metal is poured in.

Patterns.

Wooden patterns are usually made where no large number of castings are needed, and in making these proper allowances must be made for both contraction and machining, what is called a shrink-rule, being used, to save a lot of calculations. The patterns should be put together firmly with proper brads or screws, and putty should not be used in any case, as this, being soft, will not stand against the sand when it is rammed up. When finished, patterns should be coated with either pattern-makers', or hard shellac, varnish, to prevent the absorption of moisture.

Plaster patterns, more or less reinforced with wood or iron rods, are useful for many purposes, and when made of good plaster and well dried, provided they are coated with hot paraffin-wax or other good cheap waterproof material, they answer very well, although they will not bear rough usage. Metal patterns are, of course, best; but it does not pay to make these unless very large numbers of similar castings are needed. Where castings are made from finished articles they are necessarily smaller than the originals, but a little "rapping out" will overcome this.

Where holes have to be left for bolts or other purposes, cores are used, these being made in core-boxes

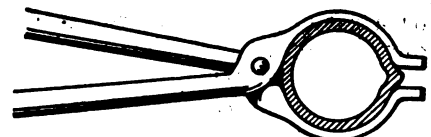


FIG. 3.—HOW THE CRUCIBLE IS HELD

of the required shape and size. Prints are put on the patterns where the ends of the cores are to come in the moulds, and the cores fit into these. By a careful examination of



a professionally-made pattern and core-box the method of working will readily be seen.

In all cases where a mould has to be partly in the drag and partly in the cope of the flask, the pattern should be split and dowed, this allowing of the part in the cope being lifted when the cope is rammed up and lifted from the drag, this making the work much easier and enabling the pattern to be removed from the mould with the minimum of trouble and damage. As the drag, or bottom, half of the flask is always rammed up first, the dowels should be in the top half of the pattern, and the holes into which they engage in the lower half, this enabling the

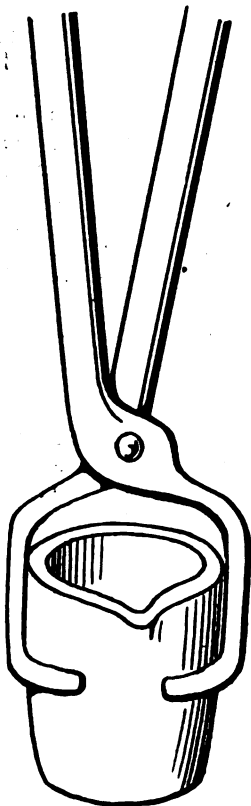


FIG. 4.—ANOTHER WAY OF HOLDING THE CRUCIBLE

half first moulded to lie flat on the board. Rapping-plates and lifting-plates may also be used; but where only one or two castings are required off a pattern, these are usually a needless expense.

Sand for Moulding.

Sands vary somewhat in both color and form; but it may be taken as a general thing that what is used in any particular district will answer very well. All sand should, when dry, pass through a 30-mesh gauze sieve; but, for some jobs, a finer sand is necessary for facing, to produce a smooth surface. These can be used for anything up to, and in-

cluding, iron for small work, provided they are used properly; but, for heavy work, some difference in the grades of sand used would be neces-

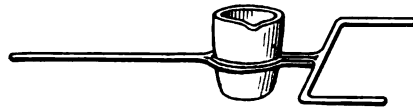


FIG. 5.—FOR CRUCIBLES HANDLED BY TWO MEN

sary, although this would not trouble the beginner.

As is generally known, green sand moulding is done with damp sand, and it is in the dampness that difficulty is found. If the sand is too dry it will not bind sufficiently to make a mould firm enough to stand against the molten metal, while if too wet, the face of the castings will be more or less pitted, or in some cases the moulds will blow open through steam-pressure; in each case the result being disastrous so far as good work is concerned. Generally, however, if a handful of sand, when squeezed together, will form a ball without falling apart it is right for working; but even then it should be rather on the dry than the wet side. It is very necessary that the whole body of sand should be equally moist, to secure which it should be damped down overnight, and in the morning run through a ¼-inch square-meshed sieve, after which it should be thrown into a heap for use. The exact amount of moisture cannot well be given in figures, as sands vary; but a very little experimenting will show when the correct point is reached, and really the matter is not so very difficult.

For brass and all non-ferrous alloys and metals, new sand is required to start with, and this may be used with or without facing-sand; but for really fine work a facing-sand is very desirable, and this may be made as follows: Dry, say, a bushel of new sand, and after breaking it down free from lumps, pass through a 30-mesh gauze sieve without rubbing, all rejections being crushed and again sieved. To this add one to two quarts of pea or bean meal or flour, and mix thoroughly afterwards, passing through a 16-mesh sieve to insure thorough incorporation of the meal and sand, and then store away in a dry place until wanted for use. Overnight take the quantity needed for the next day's use and damp down, the next morning rubbing down hard with the edge of a board on some flat surface. About a ¼-inch of this,

when rammed up, should be sifted over the pattern, and then the flask should be filled with the ordinary sand, being careful to well vent with a fine wire. So well can this sand be made to work, that even the rough grain on the wood of the pattern will show in the casting at times, while in no case will the sand burn into the metal.

Iron requires a differently prepared facing-sand, this being made up of about equal parts of new and old sand, with from 10 to 20 per cent. of ground coal added, a rough average for the coal being about 14 per cent. of the sand by weight. This sand is sifted over the patterns to a depth varying from ¼-in. to ½-in. before ramming, the difference being dependent on the thickness of the casting. In use, the coal gives off gas which forms a layer between the mould and the metal, and thus produces a clean skin. Where no facing-sand is used, the skin of the casting is usually rougher and not so soft; but the grade of metal used also has some effect on this.

In addition to facing-sand, it is desirable to use some powder facing which is dusted over the mould, such things as charcoal, plumbago, steatite, and special blackings being used, according to the metal being dealt with. These powders are dusted on to the moulds through a cloth, sleeked down with a soft brush, and then any surplus is lightly blown out, the object being to get a smooth and more or less polished surface to the mould. The smoother the mould, the smoother the casting, as a rule, and for this reason the use of facings is desirable. In addition, the use of plumbago and similar facings tends to prevent sand burning into the metal, and in this way is good where castings have to be machined, as a clean-cutting skin, which does not damage the tools, is provided.

Moulding.

Taken generally, each pattern has to be dealt with in accordance with its shape; but, taking split patterns, or flat patterns that can be moulded



FIG. 6.—HOW THE MOULD IS MADE

in the drag half of the flask, the method of working would be as follows: The pattern is laid on the board as shown in the section, Fig. 6, the drag part of the flask being already in position, some facing-sand, if used, is placed over the pat-



tern and the flask part is rammed up, made smooth on the upper surface and vented. A board is placed on the upper part, the whole turned over, and, after removing the board, the sand is trowelled off smooth and level to form the joint, and after placing the other half of the pattern in place, the whole is well dusted with parting-sand, and the other half of the flask rammed up as with the drag. If the mould has to be cast flat, as in Fig. 7, a runner-stick

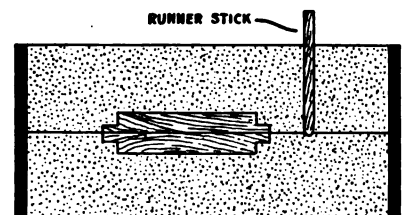


FIG. 7.—PREPARING THE MOULD FOR POURING

will have to be put in when ramming up, as shown, and this will be withdrawn before opening the flask to remove the pattern. In opening the flask, half of the pattern will be in each part of the flask, and the cope being laid over with the pattern up permost, there will be no difficulty in the removal of the pattern. Usually a sharp spike is driven into the wood in such a way that the weight is about even all around, and while this is being carefully lifted vertically the pattern is gently jarred or rapped with a very light hammer, the rapping being discontinued as soon as the pattern is clear enough of the sand to come out freely. The amount of rapping necessary can only be judged by the results of practical experience, as some patterns, owing to their shape, leave the sand at once, while others have to be rapped until they are practically out of the sand. When the pattern is out of the sand, sprues from the runner to the mould must be cut, any breakages in the mould must be made good, and a dusting with plumbago or other facing-powder should be given, this being sleeked down with a soft brush, and afterwards any dust should be carefully blown out with the bellows. Any cores should now be placed in to position, and the mould closed and weighted down. Where such is required, a pouring-cup should be rammed up and placed in position, as shown in Fig. 8; but it is not always that this is required, as a depression can be scooped in the sand in the flask itself to receive the metal. When the flask is closed, weights should be placed on top to keep the cope from lifting

when the metal is poured, and necessarily these weights must be somewhat heavier than the total weight of the molten metal put into the mould. Where flasks are poured on end, a cup is mostly necessary, unless the pourer is pretty expert in handling the crucible, the flasks of course being clamped together with or without boards, as circumstances direct; but a mould is hardly likely to burst if properly rammed and the enclosed air can escape freely. At first, however, it is well to pour on the flat, as this is the easier method.

Metal and Pouring.

Roughly, brass is a mixture of copper and zinc; gunmetal is a mixture of copper and tin; bearing metals are mixtures of tin, copper, and antimony; and aluminium alloys are mixtures of aluminium and zinc, with or without a small percentage of copper. Bismuth is sometimes sparingly used with some alloys, while phosphorus is used with phosphor-bronze, being introduced as phosphor-tin; but very often there is no phosphorus in the castings, as, having done its work, it comes over in the slag.

In all cases the moulds should be ready in advance of the metal, because as soon as this is in a fit state it should be poured at once, both loss of metal and dirty castings being produced when the metal is kept standing in the melting-pot. All metals should be as fluid as possible for pouring, and the greatest fluidity is obtained at a comparatively small amount of heat above melting-point, too great a heat or too long an exposure to heat, making metals dull and sluggish, and liable to "run up faint", as it is called.

When using scrap metals, careful sorting is necessary, and while iron will float off brass or gunmetal very largely, some amount of alloying will take place, while with zinc and aluminium and its alloys, a very considerable percentage of iron can be added by merely stirring with iron stirring-rods. In any case the rods should be kept clear of adherent metal, and be well-coated with a mixture of plumbago and clay—made perfectly dry before being placed in the molten metal as a matter of course—as this prevents alloying very largely. In no case may rusty iron rods be put into molten metal of any kind, or a more or less violent explosion will occur, and the writer can assure everyone that burns from molten metal are decidedly unpleasant: he has tried a few of varying magnitude and can speak from experience.

In pouring, the crucible is taken from the fire, skimmed carefully, to leave a clean surface, and then poured into the mould, holding the lip of the crucible as close to the pouring-cup as possible, and keeping this full until the mould is full. If the crucible is held high, or only a dribble of metal is run into the mould, sound castings will not often happen, while with some metals the castings will be full of hard spots, which will prevent a clean surface being obtained in machining.

What Is Combustion?

J. F. SPRINGER

Fire is, perhaps, the most powerful of all the servants employed by the blacksmith. When thoroughly understood and thoroughly controlled, fire enables the smith to work wonders. On the other hand, it is possible to make great mistakes in using this agent with the result that the work is more or less damaged or time wasted in useless efforts. A wise smith will, accordingly, seek to learn all he can about the nature of fire and the methods of controlling it.

A fire results when some fuel—such as the carbon in coke or coal—joins with the gas oxygen and forms a new substance. The process of uniting together is called *combustion* by the scientists. The new substance is a gas. If there has been plenty of oxygen, and other conditions are favorable, the new substance will be the gas *carbon dioxide* (sometimes called *carbonic acid*). If the supply of oxygen is insufficient, or if certain other conditions are lacking, the new substance will

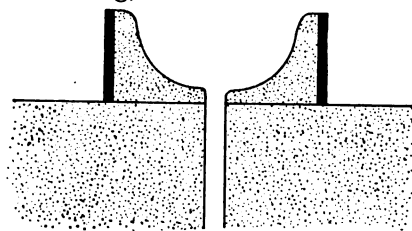


FIG. 8.—THE POURING CUP

be the gas *carbon monoxide*. While both are gases, they differ, nevertheless, from each other. Carbon monoxide is poisonous and may be detected by the nose. Carbon dioxide is non-poisonous; but you could not live in a room containing nothing else, just as you could not live in a room full of water.

In general, whenever a substance unites with oxygen to form a new substance, we have combustion. If the process goes on rapidly, we have



a fire. Combustion produces heat. Here we have a reason for the blacksmith's interest in the scientific subject of combustion. There are a great many substances with which we may make oxygen unite and thus get a supply of heat. Coal contains a number of such substances—carbon, sulphur, hydrogen. In fact, all fuels contain such substances: that is the reason they are fuels.

We are ready now for another fact about combustion. It has been found that the combustion of various substances gives rise to very different quantities of heat. When we secure the combustion of 1 pound of hydrogen, we obtain a great deal more heat than when we burn 1 pound of carbon. Indeed, if we burn 1 pound of carbon until we get carbon dioxide, we develop more than thrice as much heat as when we burn it to carbon monoxide. We are beginning now to get before us some pretty practical matters.

In order to measure amounts of heat, men have agreed on two different heat units. The one generally used in the United States and England is the *British thermal unit*. A British thermal unit (B. t. u.) is the amount of heat necessary to heat up 1 pound of water 1 degree, Fahrenheit. If we burn 1 pound of sulphur, we shall produce 4,000 B. t. u. This means that we get enough heat to increase the temperature of 2 short tons of water 1 degree F.; or, what is about the same thing, to raise the temperature of 400 pounds of water through 10 degrees; or 40 pounds, 100 degrees. I will now set down heat values of a number of fuels

HEAT CONTENT OF VARIOUS FUELS 1 Pound of Fuel

Name of Fuel	No. of B. t. u. in 1 Pound
Hydrogen	62,000
Carbon, burnt to carbon dioxide	14,500
Carbon, burnt to carbon monoxide	4,400
Sulphur	4,000
Acetylene	21,850
Coal (Pocahontas)	15,000

Hydrogen here appears to great advantage; but we must take into account that 1 pound of hydrogen ordinarily occupies a very considerable amount of space and is very expensive relatively. However, coal contains more or less hydrogen in one form or another and this helps to bring up the heat value.

Particular attention should be directed to the great difference in heat value of 1 pound of coal according as it is burnt to the one oxide or the other. Too little air is the great cause of this loss.

When a piece of fuel burns, there may be several kinds of gases given off from the fire as a result. Thus, a piece of soft coal will give off various gases because the coal itself consists of various substances. But sometimes the combinations do not form; and this is a matter of great importance to the blacksmith. For example, the sulphur in a piece of coal should unite with oxygen and form a new substance, sulphur dioxide. If, however, a piece of iron or steel is present in a highly heated condition, some of the sulphur will often penetrate the metal. That is to say, there are two bidders for the sulphur—oxygen and iron. The iron will ordinarily get some of the sul-

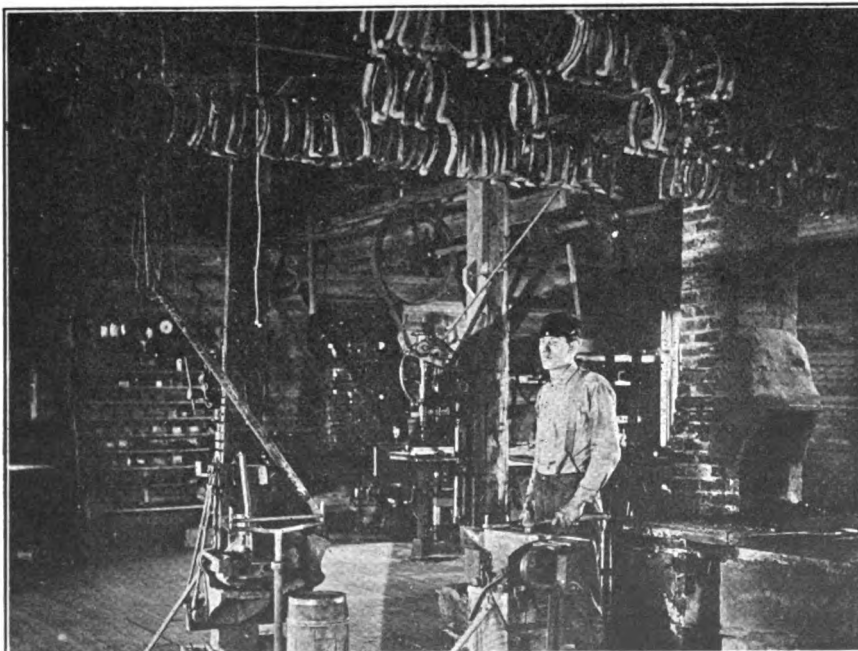
phur. The result is a damage to the metal. It becomes *hot short*—that is, the metal becomes brittle in the hot condition. Accordingly, the smith should be careful to use only those



MR. SIDDER'S NEAT RESIDENCE

coals and cokes that contain the least possible amounts of sulphur. The sulphur is a good thing for heat; but it is a bad thing for the iron or steel. Phosphorus is another substance which occurs in coal as an impurity. The effort should be to have a fuel as free as possible from this substance. It makes iron and steel *cold short*; that is, it causes brittleness when the metal is in the cold state. The smith has to inquire, then, into other matters besides that which concerns the amount of heat obtainable. Carbon is perhaps the most important of all the substances which enter into the fuels used in the shop; and yet carbon may at times become a hurtful thing. This remark applies especially to work consisting of steel. If the amount of air supplied by the bellows or other source of air is less than what is needed, some carbon may be absorbed by the highly heated work. There are occasions, no doubt, where no injury is done; but there are also other occasions, when more carbon is not wanted. Where the work is particular or where the fuel contains excessive amounts of injurious substances, there is one good and sure remedy. We keep the work free from contact with the fire by the use of an oven or other means. Thus, a metal-working drill may in this way be brought to the high temperature necessary for hardening without allowing the fire to touch it.

Combustion is the most prevalent method of getting heat, although it is not the only one. Many fuels are used; but not all of them are suited to the use of the blacksmith. The principal fuels which may be regarded as suitable either for general or



A CORNER OF MR. SIDDER'S GENERAL SHOP OF OHIO



more restricted use in the smithy are: charcoal, coal, coke, oil, city gas, and natural gas. This list contains representatives of three conditions of matter—solid, liquid, gas. In general, it may be said that liquid fuel is more manageable than solid; and gaseous, more than liquid. But cost has to be considered. Liquid fuels in general cost more than solid; and gaseous, more than liquid.

Soft coal is a kind of mixture of solid and gaseous fuel. The greater part will consist of solid carbon; but there is a good percentage of volatile matter. That is, there is a goodly portion which will turn into vapor or gas when the coal begins to heat up. This part of the coal burns easily, as might be expected; but it is also easily lost if proper precautions are not taken. The volatile part of soft coal gives off various gases which consist mostly of various combinations of hydrogen and carbon. They are, in fact, called *hydro-carbons*. Coke is, roughly, the residue left after the hydro-carbon gases have departed; it is in fact, carbon in a more or less pure state.

(To be Continued.)



Benton's Recipe Book

An Iron Cement is suggested by H. C. M., that will hold the broken parts of machines, if the parts are not subjected to too great a strain. This cement is made as follows: mix equal parts of sulphur and white lead and add about 1/6 part of borax. The three ingredients are very thoroughly mixed. When the cement is to be used wet it with strong sulphuric acid and then apply a thin layer on the parts to be joined. Now clamp the pieces together and allow to stand for four or five days until the joint is dry. This cement, it is said, will hold broken machine parts firmly.

Brazing methods and hints are always of interest to "Our Folks". There are few smith shops in which a job of brazing hasn't been attempted at some time and the customer who wants a piece sometime and the customer who wants a piece of broken machine "welded" is by no means a stranger in the average shop. That is no doubt the reason for the great amount of interest displayed by the smith in cast iron brazing. What will prove to be a new brazing flux to at least some readers of the *Receipe Book* is made as follows: four ounces Carbonate of iron and one-

third ounce of potassium chlorate. This is used just as ordinary borax in conjunction with spelter.

Non-rusting soldering solution is the request of H. T. J. If he will take three ounces of alcohol, one ounce of glycerine and half ounce of oxide of zinc, he will have a soldering solution that will work fine on steel and that will not rust or blacken the work.

Annealing steel seems to be a problem with quite a number of smiths despite the fact that we have mentioned several methods in the *Receipe Book*. There are, of course, many different ways of doing this little stunt of softening steel, but all of them have to do with the heating of the metal to a red heat and then the cooling of it just as slowly as possible. Some cool in ashes, some in sawdust and most every steel worker usually has his own pet method of cooling slowly. One method is to cover the steel with fire clay, heat it to a red and then to allow it to cool in the forge over night. This it would seem should do the work satisfactorily.

Brown finish on steel such as is found on the barrels of guns is said to be produced by applying a mixture made up of one pint of distilled water, one ounce of sweet spirits of nitre and one ounce of sulphate of copper. This is applied in four coats allowing several hours for drying between each coat and brushing after each coat. After the fourth coat has been applied rub down hard and let stand for two days. This gives a reddish-brown color without gloss. If a deeper hue is wanted add arsenic to the mixture before the last coat is put on. To polish, use a mixture of boiled linseed oil, beeswax and turpentine. This should be rather thick and rubbed well with a cotton cloth and finally with the palm.

For brass etching such as A. C. I. wants to do the following acid is suggested: 16 parts nitric acid and 100 parts of water. Then dissolve six parts of potassium chlorate in 100 parts of water. Now mix the two solutions and apply to parts to be etched. These will, of course, have been prepared in the usual way with wax or varnish.

And speaking of etching on metal reminds me of a neat little stunt that one worker in a Western shop used in marking his tools. He had a neat rubber stamp made bearing his initials and around which was a wavy border. When ready to mark a new tool he would clean and

polish the place he wanted to mark, and then by using black asphaltum varnish he would print an impression of the stamp in varnish. He then applied his etching acid inside the border of the stamp and as the acid etched only on the surface not covered with varnish his initials stood out in polished metal on a roughly etched space.



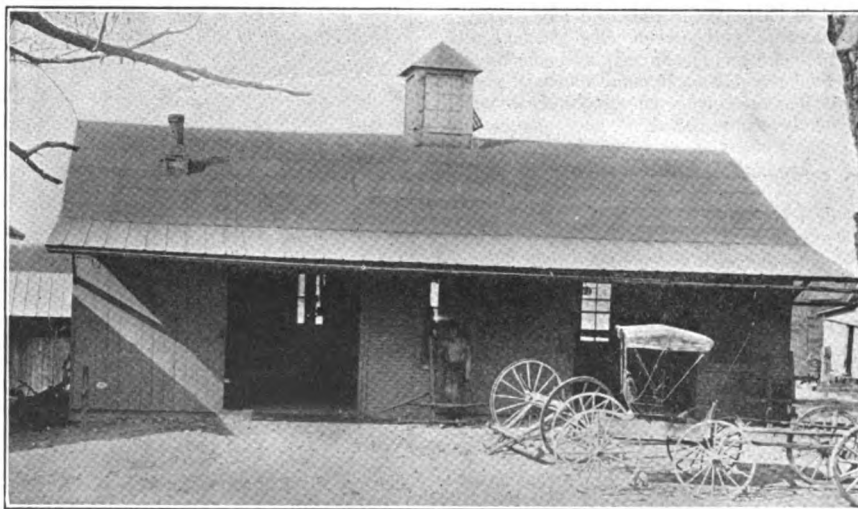
Queries— Answers— Notes

An Ohio shop and home—The accompanying engravings show my shop and also my residence. My shop is 24 by 42 with an L 14 by 21. My equipment consists of a 6-horse power Fairbanks-Morse engine, a Crescent Universal woodworker, A Buffalo drill, an emery and polishing wheel, a No. 2 Little Giant punch and shear, a Buffalo blower, No. 4 Stoddard tire shrinker, a Boyce foot vice and other tools that are necessary for a general repairing and shoeing shop. And I have a place for everything and everything in its place, which saves lots of time and worry hunting for tools, and keeps you from accusing your neighbor of stealing them when you fail to find them. My motto is to do good work and charge a reasonable price for it.

G. N. SIDDEES, Ohio.

Cannot shoe them.—We would like to know how to manage a horse that "cramps in" his hind legs when we want to shoe him. We have two that we cannot shoe at all. They are large heavy horses, not mean, only we cannot get their feet up and hold them up long enough to shoe them. Has any reader a suggestion?

S. S. YAGER, Indiana.



MR. G. M. SIDDEES OHIO SHOP IS WELL EQUIPPED



Measuring the shoe.—How do you take the measurement of a shoe when you make them by hand so that it will be the correct weight such as four, five or six ounces?

A SHOERING READER.

In reply.—This is a gift that can only be attained by years of practice; but I will give you the rule that most of the expert track shoers go by.

To make a four-ounce shoe for a number two foot, it requires 13 inches of $\frac{3}{8}$ x $\frac{3}{16}$ inch stock.

To make a 5 ounce shoe—13 inches of $\frac{1}{2}$ x $\frac{3}{16}$ stock.

To make a 6 ounce shoe—13 inches of $\frac{5}{8}$ x $\frac{3}{16}$ stock.

To make a 7 ounce shoe—13 inches of $\frac{3}{4}$ x $\frac{3}{16}$ stock.

To make a 8 ounce shoe—13 inches of $\frac{7}{8}$ x $\frac{3}{16}$ stock.

We have different methods for getting the required measurements; some take a piece of string and run it around the foot from heel to heel, this gives us the length of steel required to make the shoe. Others measure from the point of the heel to the center of the toe, double this and you have the length. Others measure across the foot at the widest part, double this and add one-half of the width of the foot, and this gives the length of material required. Three times across the foot gives us the measurement for a bar shoe.

Practice makes perfect, we hardly ever see one of the experts that follow this game do any measuring of the feet in order to make a shoe, a glance at the foot and they readily know just how much of a certain size material to cut off in order to make a certain weight of shoe.

DR. JACK SEITER.

Wants to temper bear trap springs.—I wish one of the brothers would give me a point on tempering springs for bear traps. Here in this part of the country hunting and trapping bear is a great sport. To temper the springs for these bear traps is very difficult and particular job, or else they break or they are not stiff enough. The springs are made from 2 by $\frac{3}{8}$ and $2\frac{1}{2}$ by $\frac{5}{8}$ spring steel. I have tried to temper these springs in different ways, but do not always succeed. Some information about this would be very much appreciated.

J. R. MOOYBOER, British Columbia.

To prevent over-reaching.—I would be pleased for some brother horseshoer to advise me in regards to a theory of shoeing a animal to prevent over reaching. The animal is three years old, and has a trotting harness gait (as a city driver) in traveling she swings herself and she doesn't travel regular so if some one will send me advice as a way to shoe her it will be greatly appreciated.

A READER.

In reply.—You fail to state for what purpose you use your animal, whether for road or wagon use.

As a rule most all of our young horses force or over-reach when first shod. There are several reasons for this condition. The weight of the shoes causes un-natural action and extention of the hind limbs. Lig weariness from excessive work or long drives. Driving before the animal's muscles are sufficiently hardened or developed to do the required work and enable him to carry the shoes that he is required to wear to do the work with.

Shoe as light as possible and practicable behind, extend the shoe out full to the point of the toe and have the heels trail

out well beyond the foot; if the toe is short it is a good plan to put on a toe calk, this will slow up the hind action.

In front dress the toe as short as possible and shoe with a fairly heavy rolling motion shoe. A rubber pad is also indicated. This will have a tendency to quicken the action in front, and thus enable the animal to keep the front feet out of the way of the hind ones.

As a general rule all young colts are prone to either interfere, forge or over-reach when they are first shod and put to work. The weight is un-natural, the work is tiresome, and they become leg weary and cannot help, but go bad gaited.

Judgement in driving and caring for the animal so as to keep it in good condition and strong, will do more to eradicate the trouble than a lot of shoeing.

DR. JACK SEITER.

A handy anvil tool.—The accompanying engraving illustrates a tool I find very handy and it may find favor with others. It is called a "bridge" in these parts and is used for finishing work that is too small to get over the anvil and is very useful in making small wrenches. It is best made of steel, but machine steel will do. It is one-half inch thick, four inches long and four inches wide. I have a small slot cut in one edge for narrow work. This slot goes in only about one-half inch. To me it is a very useful tool and hope it may be the same to some other smith.

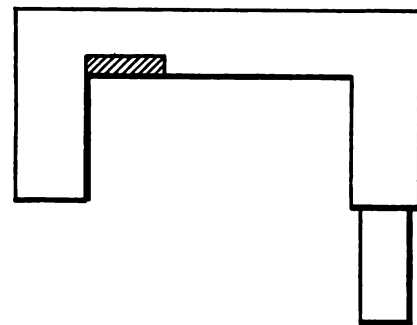
H. N. POPE, Connecticut.

From Far Western Canada.—I am receiving THE AMERICAN BLACKSMITH very regularly and appreciate its value very much. I am 44 years of age and have been in the blacksmithing business since my school years, but every time when I am reading your paper I learn something.

Business in this part of the country is not as good as usual, on account of the war, but our prices are good. I will give you a few prices for our work:

Horseshoeing up to No. 3, \$2.00; four new shoes for No. 4, 5, and 6, \$2.50 and No. 7, \$3.00; pointing plow shares, \$1.50; resetting tires, \$5.00 per set; new buggy rim, \$3.00; new hack rim, \$3.50; new

wagon rim, \$3.50; new wagon rim, 3-inch, \$5.00; new tire on buggy wheel, \$3.00; new wagon tire, $\frac{1}{2}$ by 3, \$5.00 each. A couple of weeks ago I put on four wagon tires, $\frac{3}{4}$ by $3\frac{1}{2}$, which cost my customer \$32.00. Of course, we have to charge high prices here, as the freight on everything is



A HANDY ANVIL HELP

very high to this section. For instance, we have to pay \$26.00 per ton here for blacksmith coal.

There are about 2,500 people living in this town and surrounding territory with two blacksmith shops, and we have an understanding with each other to keep the prices up as we don't believe in cutting prices.

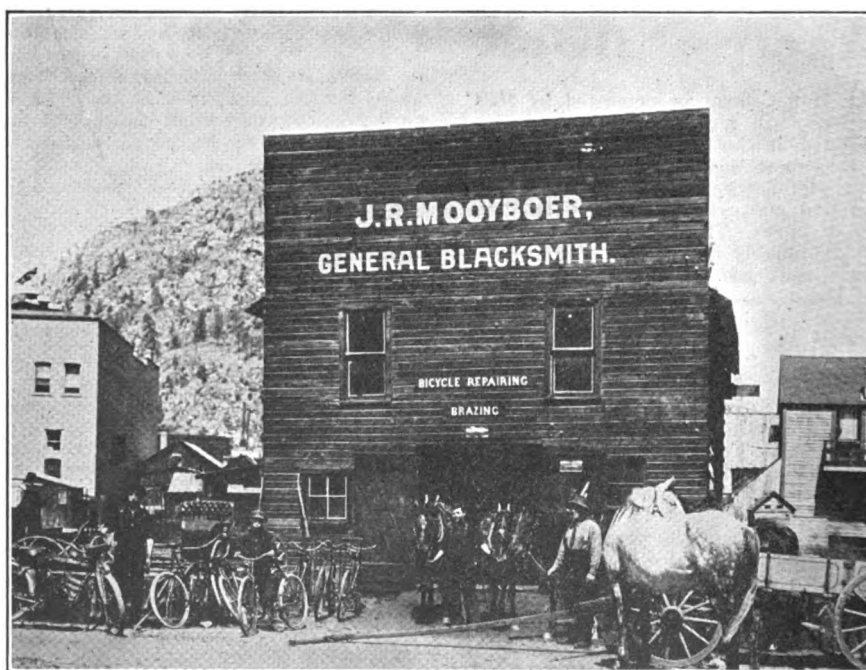
I am doing bicycle and motorcycle repairing also. Last year I bought an auto-genous welder and I am very much interested in your article about that subject. The article in your September issue by Mr. Durham, I think is very good and easy to understand.

The accompanying engraving shows my shop on a busy day. I am standing at the motor cycle.

J. R. MOOYBOER, British Columbia.

From a Canadian Smith.—I have been very much interested in your paper and enjoy very much the talks on different kinds of work and especially on business methods such as the book-keeping, etc.

We certainly cannot run a blacksmith business without a system, but there are



THE GENERAL SHOP OF MR. J. R. MOOYBOER IN BRITISH COLUMBIA

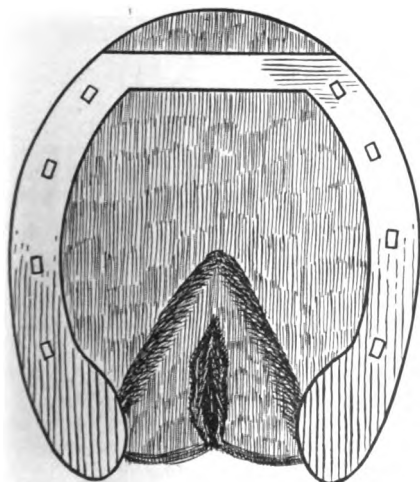
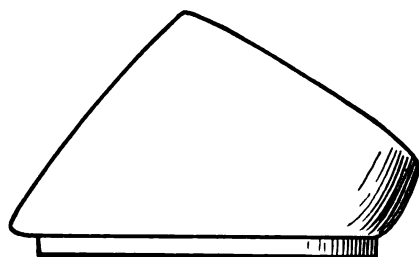


THE CANADIAN SHOP OF MR. J. WATSON

so few of us that know where we are at. We think we are making money because we are busy, but when we start to figure, the figures talk and they open our eyes and surprise us. I am enclosing a snap shot of my shop where we do every kind of work that the farmer or I may say customers want done. Our prices are fair, but we do need organization as we have competitors shoeing horses for almost one-half the price we get. I believe the time is near when the trade will be one of the best.

JAMES WATSON, Ontario.

On over-reaching.—Over-reaching in a horse is very annoying and sometimes a very serious matter and so in some cases impossible to overcome. I had a case here about a year ago where I tried every imaginable way without much success. At last I hit it, and this was the way and the only way I could handle that case and have a complete success: The animal in question, a mare four-years-old, 16 hands high, with very nice action, but very high in front when pushed hard. After using three or four different kinds of shoes without doing much good I took a heavy No.



MR. WENKE SUGGESTS THIS SHOE AND FITTING

3 toe weight shoe in front, with a decided roll at the toe. Ordinarily the mare wore a No. 9 shoe all around. Of course, the shoes were very short at the heels, although not short enough to hurt the mare. The hind shoes I forged by hand out of stock one by ½-inch. I left the heels the width and thickness of the stock up to about the last nail hole. From the last nail hole I forged the shoe down to a half-inch square all around the toe and made the toe square I set the shoe about ½-inch back from the toe, which I left standing over and in front of the shoe. The shoes were fitted properly to the foot otherwise, however, without muling the outside branch of the shoe. Shoes were about ½-inch longer than the foot at the heels. This mare never over-reached again, and I shod her about a year that way. Of course, there are other ways to shoe an over-reaching horse and I have had complete satisfaction in shoeing horses the following way! An ordinary, but heavy front shoe, in front with a heavy roll and moderate heel calks. On the hind feet I used an ordinary hind shoe, but toe calks on the toes, and left off the heel calks. This was done in order to lengthen the stride in front and retard it behind. This is a pretty good way in slower horses, but in any fast going horse I have found the former method the best.

FRANZ WENKE, Colorado.

Scientific Shoeing — Thrush — Cutting Guage Glass—Engine Pounding.—It occurred to me several years ago to try and assist nature while shoeing. Now I have brought this theory into practice. When a horse comes my shop to be shod I take into consideration the build and conformation of the animal. I pay strict attention the way the old shoe is worn before paring the foot. If a horse shows that he wears his shoe at the toe than any other point I shoe with a rolling toe. If the outside is worn thin I pare the outside lower thus I try to assist nature while others try to weld on reinforcements to make shoe last longer at the parts worn. I help the wearing process and thus distribute the road friction instead of putting on the road friction instead of putting on more to wear off. I have always had best success in shoeing interfering horses by shoeing with an inside heel calk and rolling the outside toe while in some cases I use a Philadelphia kink in outside heel. My first time in shoeing an interfering horse I shoe perfectly level. Next I elevate the inside. I keep changing and straightening inside until I get results. I have found out that what will keep one from striking will fail in another case.

My remedy for thrush is Commercial solution of anatomy, better known as butter anatomy. This is an old-fashioned remedy. I will also add a new trick, not new to me, but to some on how to cut or break a guage glass. Take a dew soaked match or wet in water and draw a line on the inside of the guage glass with the wet head. Now take a dry match, light it and roll glass in flame at point where inside line has been drawn with wet match head.

Will some one tell me what it does to overcome pounding on inside of gas engine cylinder when turned to high speed.

C. BRAVENDER, Mississippi.

In Reply—Pound in a gas engine may be caused by a number of things, the most frequent being looseness in bearings or a loose flywheel. The pound that is apparent only at high speed is evidently caused by faulty ignition of the gas

charge. This may be caused by carbon deposit in the cylinder. We would suggest experimenting with the spark timing at high speed. Then if the pound persists, examine the cylinder for carbon deposit and for looseness and broken parts.

L. E. B., New York.



The Automobile Repairman

Lubrication is such an important matter on the motor car that it isn't well to overlook it at any point, though if the reader has had any considerable experience with motor cars he will have observed that many are inclined to forget the proper lubrication of the numerous short shafts and spindles about a car, connected generally with the clutch, brake, or gear-changing systems. Such shafts can give very considerable trouble by binding if neglected, wherefore their periodical oiling should on no account be omitted. Oil holes will generally be found, but sometimes are not well placed, in which case a new one should be drilled. These minor details are generally insufficiently protected from dirt, and the careful repairman will fit clip rings similar to those used on cycles. The type of gear change employing concentric shafts to which the selectors are attached at the quadrant requires ample lubrication, as any foreign matter will mean sticking and imperfect register of lever and selectors. The increasing practice of bringing such levers inside the frame and protecting them by enclosure within the body is an excellent one. In some cases these shafts are sent out a little tight, when they may with advantage be eased. There is a danger, however, in making the fit too easy, for it will be equally easy for dirt to find its way in. For lubrication, a greaser filled with a fairly fluid grease is good, as the pressure forces the grease outwards, preventing grit from entering. If oil is used an occasional thorough flushing with kerosene will keep the surfaces clean, and make for easy changing.

Tires should not be allowed to stand in pools of water in the garage, as the moisture will penetrate to the fabric through cuts, paving the way for a blow-out. At the season of the year, when the roads are covered with snow and ice, the wheels become covered with slush, which melts in the garage. It is a good plan to turn the hose on the wheels, washing off all deposits, then move the car to a dry place. If the garage is not heated, ice is likely to form, freezing the tires to the floor.



An acid-proof cement for joining and repairing fibre and other parts on battery jars is made of two parts of powdered asbestos, one part ground baryta and two parts sodium water-glass solution. This may also be used for uniting metals.

Dents in hollow metal articles such as radiator tanks, lamps and the like can be easily removed by following the hints detailed: If the tank of a radiator is indented, a loop should be made in a piece of stout brass, or bright steel wire, bent at right angles, and soldered to the lowest part of the dent. A larger loop should then be made in the other end of the wire, and with the aid of a lever and block of wood resting on the tank to form a fulcrum so as to dispose the force of the pull on the lever over a fairly wide area, the dented surface can easily be pulled flush with the rest of the tank surface. Dents in head lamps and other small articles can be taken out in a similar manner, though in place of the lever a strong cord should be attached to the wire loop and its free end fastened to a vise or any convenient anchorage. In case it becomes necessary to treat a horn it is grasped in the hands, and a few gentle jerks will remove the dent. The wire loop in both cases can easily be removed by means of a blow lamp or a soldering iron. No doubt more elaborate methods can be resorted to for this sort of work, but probably the above method is as quick as any, for a piece of wire can be bent to any shape to suit the job under consideration. No tools of any value are necessary, and such as are used, viz., a piece of stout wire and a soldering iron, can be found in almost any house. Of course, if the dented article is made of too strong a gauge of metal something stronger, such as a back cable socket, must be used for soldering in for the hollow or dent.

A Discussion of the Automobile Situation as it Affects the Smith

JOHN DENBO.

If I had no help auto repairing would effect the different branches, for the reason that auto work and general repair of farm and machinery can not be handled successfully without help. Some branch of your business has got to suffer. The mower and binder, plow, engine and threshing machines have each got their season. Shoeing has decreased with me some. It will be affected more so later on. The auto is a continuous branch, or will be if you take it up. This branch is one of study. It isn't like repair work on binder or mower. It is a new study for the boys and it has to be mastered and will be in a few years to come. I will admit that taking up auto work is a detriment to our business unless you have help. If you take up the auto repair business you will find that you will get to saying to your good customers: "Can't do

it today, got the autos to work on. I'll do it tomorrow for you" and presently the word goes around: "No use to go to the smith, he is taking in auto repair work and he's too busy to do farm work." And then you will notice your general work falling off. Just a little at first, then after while a little more and finally one branch or the other will be on the bum. Don't go into the auto game unless you want to drop general repairing because your trade will suffer. Of course, if you have help to attend to the other branches of your business it is different.

The auto repair business is a paying proposition. There is money in it, the work is encouraging for the simple reason that nine times out of ten it's spot cash and no grumbling. You can charge fifty cents an hour for running a wire up in the drain cock of the radiator to open it up and the owner of the car will pay you without a word, even if he is a farmer. But charge him the same thing for work on his mower and he will never get through howling. It's a fact; I'm talking from experience. I have tried to give you my idea of the auto trade. I say, go to it, but first get fixed so that none of your other lines will suffer. Employ good help, and pay good wages, and your auto business will be a success. But if you intend to do general blacksmithing as you always have done you will find out that it's either auto work and let the rest go, or general work as usual and let the auto go,

that time I drove a nice horse to a good buggy and spent my working hours sharpening plows, setting tires and shoeing horses. One day an oil driller came along with a big red Kiesel Car that he wanted to get rid of and proposed a trade. The wind-up of the conversation resulted in his driving my horse and rig away and leaving the car with me; and right then I commenced the auto repair business, but I am not sorry for its a good game and I expect to play it till I die.

"The wages in this country for auto repair work are not so awfully high: we figure our time at sixty cents an hour. But the work is so much easier as a rule than shoeing horses or setting wagon tires, and as a general thing, the business relations existing between the shop owner and the customer are so much more pleasant. The average auto owner has the money with which to pay his bills promptly and as a usual thing he does not kick about the charges being too high. If he does, tell him as I did tell one man the other day: 'The thing to do is to pay what the other fellow charges once anyway, and then if the price don't suit take your work some place else.'

"There is nothing complex about either the design or the operation of an automobile. Practically the same construction prevails in all cars that are made and sold today. A clear insight into the fact that the principle of operation of the motor is absolutely the same in all of them; in fact the only really important thing that the blacksmith has to keep in mind is the fact that he should charge a good round profit on each bolt, nut, washers or other piece of material used on the job, and then to add the labor charges for every minute spent on it.

"We have added oxy-acetylene welding and vulcanizing to our other lines since we commenced the repair of autos and the regular sixty cents an hour charges does not apply to those departments. No matter how small the weld on the oxy-acetylene plant, and if the break is very



THE AUTOMOBILE SHOULD HAVE THE ATTENTION OF THE GENERAL SMITH

unless you have plenty of help. I have at hand a letter from a friend in Kansas and you can read what he says about the matter:

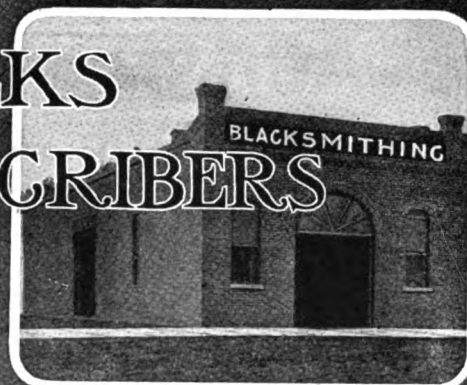
"Five years ago I did not know any more about the interior anatomy of an automobile than did a six-year old boy. At

extensive, have charges as much as a new piece was worth to fix the old one.

"I am not making any boast of either equipment or prices, but rather to show you that in this auto work you can charge about what you please, and still keep the good will of the customers because the main idea is to get 'her running again.'"



TIMELY TALKS WITH OUR SUBSCRIBERS



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The New Year and the Old

This issue marks the last one of the old year. Again we pause momentarily in our labors to ponder over the past year and to consider the New Year. Let us not stop too long in thinking of the past—merely long enough to glean from it the lessons it may teach us. Let us not mourn over the mistakes and the happenings that have occurred during the past year. Let us merely consider them as directing our course during the coming year of our labors. Thinking of the past only in its relation to the future, will enable us to steer a wiser course during this year that is to come.

And what this new year of 1916 has in store for the smithing craft, it is of course, impossible to say, but let us resolve that the year will find us ever on the alert to take advantage of opportunities as they come. Let us resolve not to permit any of the trade that rightly belongs to us to get away from the craft as a whole. The coming year should present greater opportunities to the live craftsman than any year in the history of our centuries-old craft. To the practical man, one who has kept himself posted upon current craft events, the coming year will present many problems for his solution, and these problems, because of the very fact that he has kept himself posted, will prove of easy solution.

Very naturally, of course, the individual craftsman's success in solving problems of his next year will depend upon each man's familiarity with existing conditions.

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When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon him showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

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For the Automobile Repairman

In this issue begins a series of articles that should prove of inestimable value to the general smith who sees the opportunity in automobile-repairing. The general blacksmith cannot, of course, attempt to do automobile work unless he is equipped for it. He cannot fit it into the work he is doing at present without it conflicting with the regular lines he is now taking care of. When your regular customer calls with a shoeless horse or a wheel that is minus a spoke or two, and finds you at work taking down an automobile, and then in reply to his questions you say that you cannot get at his work for several hours, he is very likely to take his trade elsewhere.

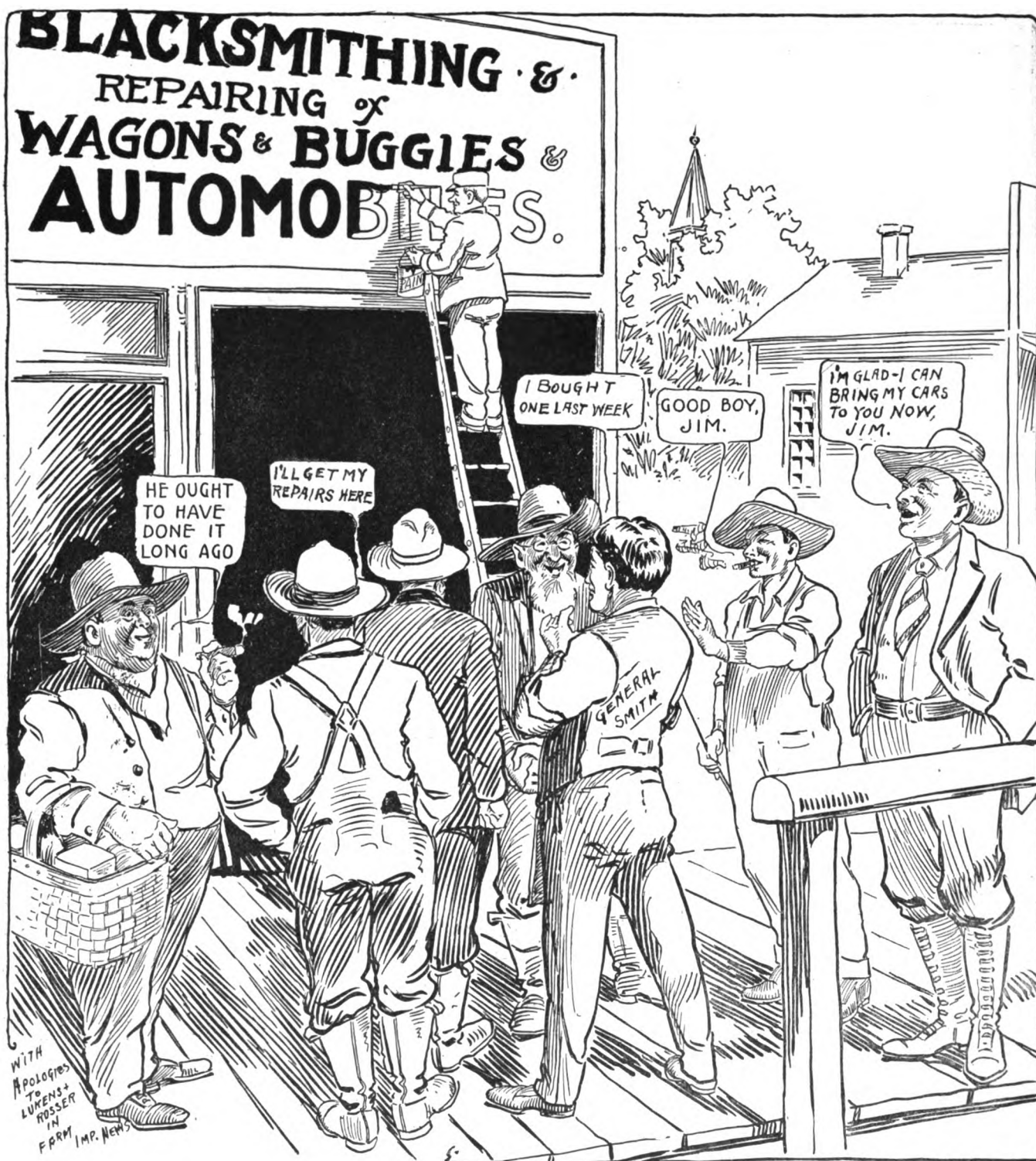
But if automobile repairing rightly belongs to the blacksmith you say: "What is the blacksmith to do?"

The only way in which the general blacksmith can take care of automobile work is not simply to try to fit it into his present line, but make it one of his lines. Put in an automobile repair equipment and then hire an extra man or two to do the work, and the series of articles beginning in this issue will tell you exactly how to equip the automobile repair shop, how to get the business, how to keep the shop accounts, and will in short, tell you all about automobile repair work from beginning to end.

If you are now doing automobile repair work, you will read this series of articles with a great deal of interest, if you are not doing automobile repair work, you will find this series of articles of immense practical worth to you, as it will show you the way to additional profits and more business.

The Feature Article

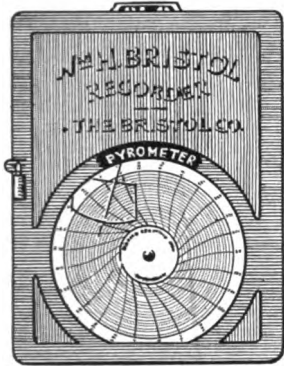
The principal article in this issue is by a man whose name is already well-known to a great majority of our readers. To those readers who have already read some of his articles, this month's article will be a real treat. Mr. John Jernberg is prominently connected with the Washburn Shops of Worcester Polytechnic Institute, and in this article on the subject of The Carbon Content of Case Hardened Steel, he goes very carefully into the matter of the temperature and time. Mr. Jernberg's ability for going into details of tests of this kind is well-known.



ADDING A WORD TO THE SHOP SIGN

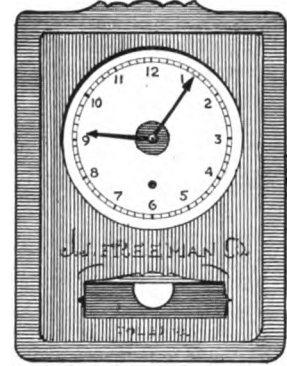
Lots of smiths are making that change in their signs. Others are letting "some other chap steal a march on them". They are leaning back in their armchairs of self-satisfaction and letting business, that should really come to them, slip through their fingers. Some are "afraid they cannot do the work", others say "autos and horses don't mix"; and still others say, "y" can't do auto work in a smith shop". And yet every day adds to the number of progressive smiths, who seeing the sign of the times, are adding another line to their shop signs. These smiths are looking to the future. They can see beyond the wall of today. They see an increasing business, larger shops, bigger trade and better profits.

Is anyone more advantageously situated to do automobile work than the general smith? Is any one better qualified to do the work right? The general smith is rightly entitled to this business, and to this opportunity for profit. The opportunity awaits—will you grab it, Mr. General Smith? Or are you going to let the automobile owners', the truck owners' and the tractor owners' dollars just slip through your fingers?



THE EFFECT OF TEMPERATURE AND TIME ON THE CARBON CONTENT OF CASE HARDENED STEEL

■ JOHN JERNBERG ■



CASE hardening is being used more and more commercially, but as yet is generally done inefficiently. The problem before the commercial world today is to get the required case at the least possible cost.

The process of case hardening consists of packing iron steel pieces in contact with some carbonaceous material in some form of crucible, and then heating the crucible and contents to a certain temperature and keeping them at that temperature for a given length of time. It is found that this process serves to drive some of the carbon into the steel and converts it from a soft steel to a steel capable of being hardened.

The term "case hardening" naturally means the formation of a thin shell of higher carbon content than the original material contained. This shell, due to its higher carbon content, can be hardened to resist wear, while the core, being of a lower carbon content and consequently softer, gives the necessary toughness.

Case hardening compositions may be divided into two classes, namely: those in which carbon is present either as gaseous hydrocarbons, or in a form from which gaseous hydrocarbons can be produced, (in either case the hydrocarbons have to be decomposed before the carburizing of the iron begins), and those in which the carbon is present chiefly in form of fixed carbon. The composition should contain a higher percentage of carbon in a state so that it may be freely imparted to the iron or steel. This carbon should exist chiefly as fixed carbon, although it is essential that some hydrocarbons or nitrogenous matter be also present to act as carriers of the carbon and to hasten the carburizing process.

The efficiency of the carburizing material is not dependent entirely upon its speed of carbon penetration, but also, and essentially, upon

the effect it produces on the percentage of carbon as it is absorbed by the iron or steel. With normal case hardening the percentage of carbon in the case or carburized zone should be equal to that of saturated steel which contained about 0.90 per cent. carbon, but in actual practice the percentage may run considerably above this.

As regards the selection of carbonizing material, the following general conditions may be stated:

(a) The carbonizing material ought to have as high a velocity of penetration as possible, as the longer the operation lasts the more expensive it is, and the more chance for the metal to change its properties.

(b) The carbonizing material must not contain sulphurous matter, as the metal absorbs it and becomes hot short. At most there may be up to two per cent. sulphur at a temperature of 1650° to 1740°F. Between 1740° and 1830° the sulphur volatilizes.

(c) The carbonizing material must be as good a conductor of heat as possible. This is important in order to minimize the errors due to the difference of the temperature of the furnace and the pieces being carbonized.

(d) It must have as low a specific heat as possible. This property is necessary for the same reason as the preceding one.

(e) The carbonizing material must not alter the surface of the piece. In addition, a good carbonizing material has to satisfy the following conditions:

(a) It must contain materials

Temp.	2-hrs.	4-hrs.	6-hrs.
1600°	1	7	44
1650°	2	8	55
1700°	3	9	66
1750°	4	11	77
1800°	5	22	88
1850°	6	33	99

TABLE A.—HOW THE PIECES WERE MARKED FOR IDENTIFICATION

which can be easily powdered in order to give a uniform and close mixture.

(b) It must not exhaust rapidly; good case carburizers can be used many times with great economy and regularity of results.

(c) It must not be expensive; must be free of danger of explosions and must not produce dust excessive in quantity or dangerous in action.

(d) It must not decrease in volume while in the carburizing boxes, since heaping up of the carbonizing material might cause uneven distribution and some of the pieces undergoing case hardening might bare. Hence the necessity of avoiding too fluid or volatile elements in the composition adopted.

The steel employed should be low in carbon in order to provide the necessary toughness. The case on a piece should be of at least 0.90 per cent. carbon, otherwise, it will not harden glass hard. When the iron has absorbed about 0.90 per cent. carbon, it is said to be saturated and this means that the relation between the carbon and the iron is such that a definite chemical compound, Fe₃C, the carbide of iron, has been formed. The results obtained are governed by the following five factors:

- (1) The nature of the steel.
- (2) The nature of the carbonizing material.
- (3) The temperature of the furnace.
- (4) The length of time of heating.
- (5) The heat treatment which follows carbonizing.

Statement of Problem.

The object of this work was to find the carbon content of the steels as the distance from the surface increased; the temperature and time of the heats being varied. There were two kinds of steel used, one of 0.12 per cent. carbon and the other of 0.28 per cent. carbon. The 0.12 per cent. carbon steel is a little low in carbon as the ordinary commer-



cial steel seldom goes below 0.15 per cent. carbon. The 0.28 per cent. carbon steel is a good average as the upper limit for case hardening is about 0.40 per cent. carbon.

The carbonizing compound was furnished us by the Springfield Facing Company for this special purpose. As we had nothing to do with the preparation of this com-

It was necessary to use graphite crucibles as cast-iron crucibles, which are sometimes used, would not withstand the high temperature employed. Graphite crucibles are rather expensive; they must be handled carefully as they will break easily, and will deteriorate rapidly if used continuously at high temperatures.

us, were cut into six-inch lengths and the outside scale turned off to present an even and clean surface for the penetration of the carbon. The two steels were classified as A and B, A being the 0.12 per cent. steel, and B being the 0.28 per cent. steel. The pieces were numbered according to Table A. There were three pieces of each kind to a heat,

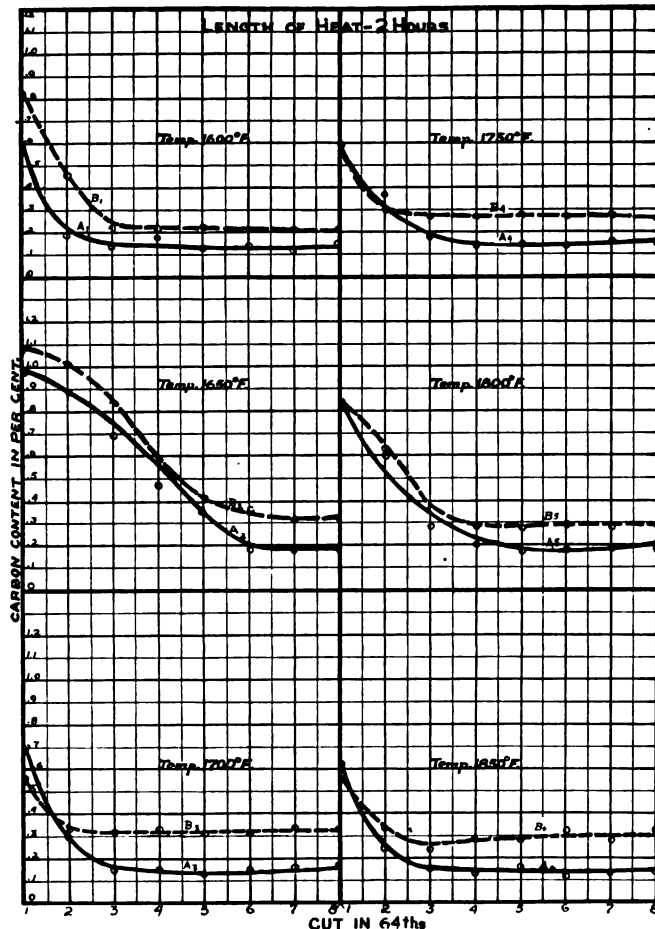


CHART 1.—SHOWING CURVES FOR PIECES A-1 AND B-1 TO A-6 AND B-6 INCLUSIVE

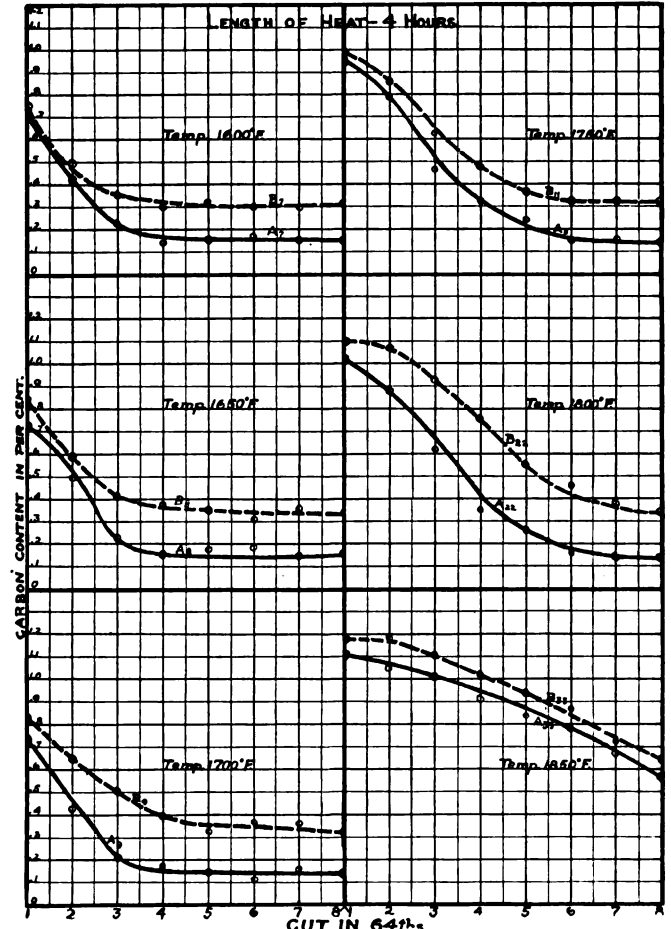


CHART 2.—GIVING CURVES FOR PIECES FROM A-7 AND B-7 TO A-33 AND B-33 INCLUSIVE

pound, we do not know its composition.

Description of Apparatus.

The furnace used was a circular crucible furnace, lined with fire-brick, and separated from the external steel plate shell by a layer of sand. Illuminating gas was used as a fuel. Air under two pounds' pressure and the gas are mixed in a Y connection. Just beyond this point the mixture divides, one-half going to each side of the furnace. The openings into the furnace are flared toward the inside to give the entering mixture a circular motion, thus enveloping the crucible in incandescent gases. This circular motion serves to heat the crucible evenly on all sides.

New graphite crucibles were used.

A Bristol indicating pyrometer was used to determine the temperatures. This consists of a thermocouple connected to a galvanometer calibrated to read up to 2400°F. The fire end of the thermocouple is made up of Platinum-Rhodium and protected from the oxidizing effect of the flame by means of a closed pipe which was shrunk on over the end.

Method.

There were two grades of steel used, the analyses of which are given below:

	A	B
Carbon	0.12 %	0.28 %
Manganese	.75 %	.57 %
Sulphur	.083 %	.029 %
Phosphorous	.102 %	.017 %
Silicon	.042 %	.025 %

The steel bars, as furnished by

making six pieces in the crucible to each heat.

There were eighteen heats run in all, using three different times and six different temperatures. In running the heats it was found that it took about an hour and a half for the heat to penetrate the carbonizing compound to the center of the crucible and bring it up to the required temperature, so the length of time of each heat was added to this value.

The pieces were packed in the crucible so that there would be plenty of the carbonizing compound on all sides and then the crucible was sealed by a cover and fire clay. The object of making the crucible air tight was to prevent the gases, which were given off, from escap-



ing, as they are needed to help the penetration. After heating for the required length of time, the gas was shut off and the pieces were allowed to cool in the crucible. This slow cooling was for the purpose of annealing the pieces.

The pieces were then placed in a lathe, and after removing the scale, chips were taken off for every sixty-

fourths of an inch for eight sixty-fourths. The chips of each of the corresponding cuts of the three pieces of the same steel, which had been subjected to the same treatment, were thoroughly mixed and placed in envelopes which were the same as the pieces. These samples were taken to the American Steel and Wire Company for analysis for their carbon content.

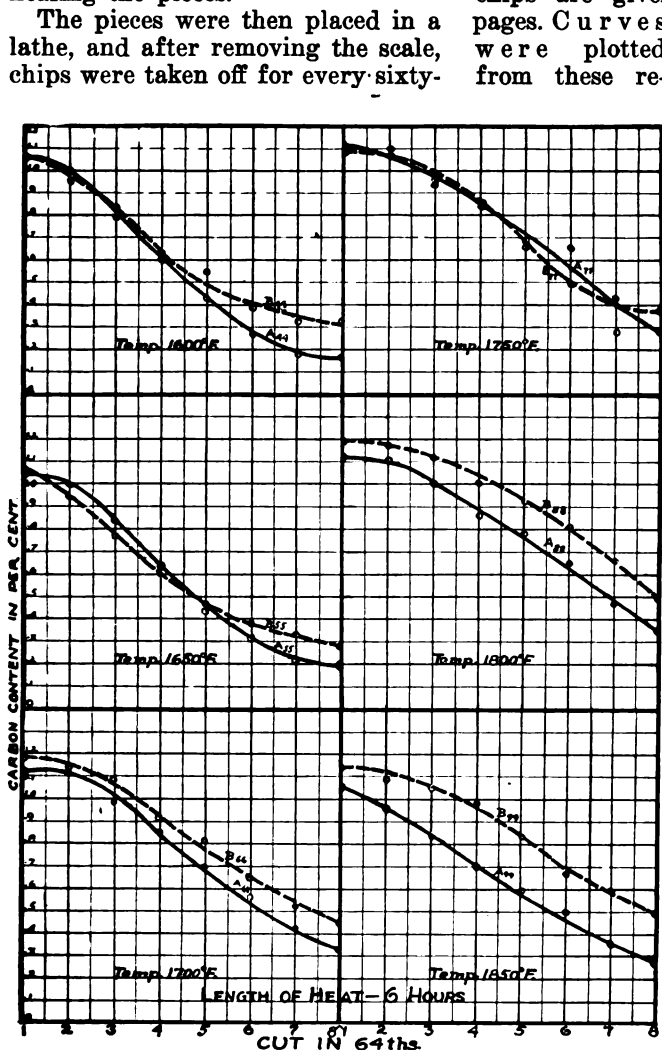


CHART 3.—THE CURVES FOR THE REMAINING TWELVE PIECES ARE SHOWN HERE

fourth of an inch for eight sixty-fourths. The chips of each of the corresponding cuts of the three pieces of the same steel, which had been subjected to the same treatment, were thoroughly mixed and placed in envelopes which were the same as the pieces. These samples were taken to the American Steel and Wire Company for analysis for their carbon content.

Some difficulty was experienced in cutting off the chips at a high speed without burning them, and this difficulty became more evident as the carbon content increased. This was overcome by taking a very light chip. Another difficulty was that the chips came off in long rolls and we wished to avoid this, as fine chips were better for analysis. To

Results.

The results of the analyses of the chips are given in the following pages. Curves were plotted from these re-

hour heat show a sudden decrease in carbon content, indicating a thin case. The curves from the four-hour period do not drop off as rapidly, showing a thicker case and also a higher carbon content. The six-hour

Sample No.	Cut in 64ths.	Carbon Content	Sample No.	Cut in 64ths.	Carbon Content	Sample No.	Cut in 64ths.	Carbon Content	Sample No.	Cut in 64ths.	Carbon Content
A. 1	1	.56	B. 1	1	.82	A. 11	1	.98	B. 11	1	.98
A. 1	2	.19	B. 1	2	.46	A. 11	2	.79	B. 11	2	.86
A. 1	3	.14	B. 1	3	.32	A. 11	3	.50	B. 11	3	.64
A. 1	4	.18	B. 1	4	.32	A. 11	4	.34	B. 11	4	.50
A. 1	5	.13	B. 1	5	.32	A. 11	5	.20	B. 11	5	.35
A. 1	6	.14	B. 1	6	.31	A. 11	6	.14	B. 11	6	.32
A. 1	7	.12	B. 1	7	.31	A. 11	7	.15	B. 11	7	.35
A. 1	8	.15	B. 1	8	.31	A. 11	8	.14	B. 11	8	.32
A. 2	1	.98	B. 2	1	1.08	A. 22	1	1.01	B. 22	1	1.10
A. 2	2	.89	B. 2	2	1.01	A. 22	2	.87	B. 22	2	1.07
A. 2	3	.69	B. 2	3	.84	A. 22	3	.67	B. 22	3	.92
A. 2	4	.57	B. 2	4	.58	A. 22	4	.40	B. 22	4	.75
A. 2	5	.39	B. 2	5	.40	A. 22	5	.29	B. 22	5	.54
A. 2	6	.18	B. 2	6	.36	A. 22	6	.15	B. 22	6	.41
A. 2	7	.18	B. 2	7	.31	A. 22	7	.16	B. 22	7	.36
A. 2	8	.18	B. 2	8	.32	A. 22	8	.13	B. 22	8	.33
A. 3	1	.70	B. 3	1	.66	A. 33	1	1.10	B. 33	1	1.17
A. 3	2	.30	B. 3	2	.33	A. 33	2	1.06	B. 33	2	1.17
A. 3	3	.15	B. 3	3	.32	A. 33	3	1.01	B. 33	3	1.10
A. 3	4	.15	B. 3	4	.33	A. 33	4	.92	B. 33	4	1.02
A. 3	5	.13	B. 3	5	.31	A. 33	5	.88	B. 33	5	.93
A. 3	6	.16	B. 3	6	.31	A. 33	6	.84	B. 33	6	.84
A. 3	7	.16	B. 3	7	.33	A. 33	7	.60	B. 33	7	.73
A. 3	8	.17	B. 3	8	.33	A. 33	8	.55	B. 33	8	.64
A. 4	1	.56	B. 4	1	.59	A. 44	1	1.06	B. 44	1	1.06
A. 4	2	.37	B. 4	2	.30	A. 44	2	1.00	B. 44	2	.95
A. 4	3	.18	B. 4	3	.27	A. 44	3	.79	B. 44	3	.84
A. 4	4	.14	B. 4	4	.27	A. 44	4	.61	B. 44	4	.63
A. 4	5	.15	B. 4	5	.28	A. 44	5	.43	B. 44	5	.55
A. 4	6	.14	B. 4	6	.27	A. 44	6	.27	B. 44	6	.39
A. 4	7	.16	B. 4	7	.28	A. 44	7	.18	B. 44	7	.32
A. 4	8	.15	B. 4	8	.26	A. 44	8	.17	B. 44	8	.33
A. 5	1	.82	B. 5	1	.84	A. 55	1	1.04	B. 55	1	1.06
A. 5	2	.63	B. 5	2	.64	A. 55	2	1.00	B. 55	2	.94
A. 5	3	.28	B. 5	3	.36	A. 55	3	.84	B. 55	3	.77
A. 5	4	.20	B. 5	4	.28	A. 55	4	.64	B. 55	4	.60
A. 5	5	.17	B. 5	5	.27	A. 55	5	.46	B. 55	5	.44
A. 5	6	.18	B. 5	6	.29	A. 55	6	.31	B. 55	6	.38
A. 5	7	.18	B. 5	7	.28	A. 55	7	.21	B. 55	7	.33
A. 5	8	.18	B. 5	8	.29	A. 55	8	.19	B. 55	8	.23
A. 6	1	.61	B. 6	1	.56	A. 66	1	1.12	B. 66	1	1.18
A. 6	2	.24	B. 6	2	.33	A. 66	2	1.12	B. 66	2	1.14
A. 6	3	.15	B. 6	3	.28	A. 66	3	.98	B. 66	3	1.00
A. 6	4	.13	B. 6	4	.28	A. 66	4	.85	B. 66	4	.91
A. 6	5	.16	B. 6	5	.28	A. 66	5	.69	B. 66	5	.81
A. 6	6	.12	B. 6	6	.32	A. 66	6	.56	B. 66	6	.65
A. 6	7	.13	B. 6	7	.28	A. 66	7	.42	B. 66	7	.52
A. 6	8	.14	B. 6	8	.33	A. 66	8	.32	B. 66	8	.45
A. 7	1	.69	B. 7	1	.73	A. 77	1	1.11	B. 77	1	1.09
A. 7	2	.43	B. 7	2	.46	A. 77	2	1.07	B. 77	2	1.10
A. 7	3	.19	B. 7	3	.36	A. 77	3	.96	B. 77	3	.94
A. 7	4	.17	B. 7	4	.32	A. 77	4	.83	B. 77	4	.86
A. 7	5	.14	B. 7	5	.30	A. 77	5	.66	B. 77	5	.68
A. 7	6	.15	B. 7	6	.31	A. 77	6	.28	B. 77	6	.49
A. 7	7	.13	B. 7	7	.32	A. 77	7	.56	B. 77	7	.43
A. 7	8	.18	B. 7	8	.31	A. 77	8	.28	B. 77	8	.37
A. 8	1	.72	B. 8	1	.82	A. 88	1	1.12	B. 88	1	1.19
A. 8	2	.53	B. 8	2	.59	A. 88	2	1.11	B. 88	2	1.18
A. 8	3	.18	B. 8	3	.40	A. 88	3	1.00	B. 88	3	1.12
A. 8	4	.15	B. 8	4	.36	A. 88	4	.86	B. 88	4	1.00
A. 8	5	.15	B. 8	5	.33	A. 88	5	.78	B. 88	5	.92
A. 8	6	.14	B. 8	6	.38	A. 88	6	.65	B. 88	6	.81
A. 8	7	.13	B. 8	7	.33	A. 88	7	.47	B. 88	7	.66
A. 8	8	.16	B. 8	8	.33	A. 88	8	.35	B. 88	8	.50
A. 9	1	.72	B. 9	1	.82	A. 99	1	1.05	B. 99	1	1.14
A. 9	2	.47	B. 9	2	.68	A. 99	2	.96	B. 99	2	1.09
A. 9	3	.20	B. 9	3	.55	A. 99	3	.83	B. 99	3	1.05
A. 9	4	.15	B. 9	4	.31	A. 99	4	.69	B. 99	4	.98
A. 9	5	.16	B. 9	5	.35	A. 99	5	.59	B. 99	5	.83
A. 9	6	.13	B. 9	6	.36	A. 99	6	.50	B. 99	6	.66
A. 9	7	.14	B. 9	7	.32	A. 99	7	.35	B. 99	7	.59
A. 9	8	.14	B. 9	8	.32	A. 99	8	.27	B. 99	8	.50

TABLE SHOWING ANALYSIS OF SAMPLES



heat shows a still greater increase in the case and carbon content. The curves do not drop off as rapidly in either the four or six-hour periods as they do in the two-hour period and they also show that the chips were all taken from the case.

Conclusions.

The curves seem to show that the steel with the lower initial carbon content absorbed carbon at a faster rate than the other steel. This statement would not hold above the saturation point which is about 0.90 per cent. carbon. The curves also show that as the time and temperature increase, the carbon content became higher and the penetration was greater. The reason that the carbon content became higher was due to the opening of the pores of the steel by the high temperature and the increase in penetration was due to the increase in the length of time that the specimens were heated.

Some of the curves did not come out as might have been expected, due, probably, to the fact that the furnace was not always run at the proper temperature.

The 0.12 per cent. carbon steel was a poor one to use for case hardening purposes, as it was high in sulphur and phosphorous. It would appear from the analysis of this steel that it was made by the Bessemer process instead of by the open hearth process which it was supposed to be.



The Machine and Tool Smith

The Theory and Practice of Hardening—V.

J. C. WEST

There is one point that must be remembered in the use of lead; it has a tendency to adhere in places to the steel. Now this would cause unequal cooling, with a result of less hardness in the lead-covered parts, and, worse still, warping, or even splitting, from unequal contractions. The

remedy is very simple. Dip the steel article into linseed-oil and then into lamp-black, dry it gently over the fire, and lay it aside until the molten bath is ready to receive it. (Another method is to make a paste as follows: Common salt, 1 lb.; charred leather, pulverised as fine as the salt and sifted, $\frac{1}{2}$ lb.; ordinary wheat flour, $\frac{1}{4}$ lb. Mix thoroughly whilst dry, then add water, slowly stirring all the time, until the paste is about the consistency of paperhanger's paste. Use a painter's brush to apply it to the article, then put it somewhere warm to dry slowly. If dried too fast the paste will split off. The article must be quite dry before dipping it into the molten bath, or the steam generated will cause the contents of the bath to fly about dangerously. Another caution I must give: Articles having very unequal parts—i. e., some thick and others broad and thin—should not be plunged into a red-hot bath, as the thin parts would absorb heat much quicker than the thick, and the unequal expansion may cause a permanent distortion. Such articles should be put in the bath when just molten, and then the bath be heated up with the article in it; the thin portions cannot heat faster than the thick.) Common salt makes a very good bath. Simply fill the tube ladle with powdered salt, heat it to a dull red, when it smelts down as easily as sugar in a cook's spoon. The bulk of the melted salt is very considerably less than in its bar state. A molten salt bath is used exactly as the lead bath, but needs no charcoal covering. I must here give a caution. Molten baths give off bad vapors, so that they should always be used under a chimney that will carry them off from the air the workman breathes. I have used them under the hood of the smith's hearth, and have never found any ill effects. I use a smith's fire to heat my baths, as I am too far from town for gas; but, doubtless, a more controllable source of heat, such as gas, would be a great convenience. It is well, in making up the fire, preparatory to putting in the ladle bath, to get the heart of the fire some distance away from the tuyere, so that the bellows blast should go through the live embers before striking the tube ladle bath. There are several reasons for this. The fire can be fed with coal between the tuyere and the ladle bath; the blast is well heated before it reaches the ladle bath, and most of its oxygen has been expended on the embers, so that, on reaching the red-hot ladle bath, it cannot "waste" it so fast—i. e., oxidise it into scales. It is hardly necessary to warn the workman that anything put into the molten baths must be quite dry; otherwise the sudden generation of steam will blow the molten contents about, and probably cause a bad accident. In giving directions presently of how to harden chipping, turning, and planing chisels, I have assumed a second heating for the tempering process, which I shall later describe with the use of another bath; so, in quenching, the whole chisel should be plunged into the water. But if heat is to be left in the shank of the tool, to afterwards go down to the edge to temper it, then the tool should not be quenched at a line on it, or it may crack just there, from causes explained before; but the tool should be slightly "danced" up and down in the water, so that there is no set line of demarcation between hardened and annealed.

Any article to be hardened that has been planed, turned in the lathe, drilled,

or otherwise machined over, should be annealed after the roughing-cut has been taken off; and where it has been drilled, if great accuracy is required it would be well to drill all the holes rather smaller, then anneal, and afterwards drill again to the required size; and it must be allowed for in drilling that the after-hardening will slightly alter the size of the hole. After the roughing-cut has been taken off, and the article annealed, the finishing-cuts must be taken, and then be again annealed before hardening. Removing portions of a piece of steel releases internal strains, as may be proved by turning an iron shaft in the lathe without annealing it first, and seeing what a "wobbler" is produced. With short pieces of steel, these released internal strains will not reveal themselves until the article is quenched, and then they do by distortions, warpings, and cracks even. With long screwing-taps, reamers, milling cutters, and similar articles, these precautions are very necessary.

Where much expensive work is going to be afterwards put upon a forged-steel article—say a formed milling cutter, for instance—the best fuel to use on the fore-hearth is wood charcoal, as this contains none of the injurious impurities of coal, requires a less air-blast, so not subjecting the steel so much to the action of oxygen, as well as protecting it from that action by the greater amount of carbon-dioxide charcoal gives off. Decarbonisation of steel, or "perishing", as it is called by workmen, is different to "burning" it by too high a heat. Steel is decarbonised at any red heat, although very slowly. The effect is similar in principle to the process of making iron castings malleable by exposing them, when red-hot, to the action of oxygen-giving substances for days. It would appear that the carbon in both cases was eliminated from the surface by combining there with the oxygen from the oxides presented to it by a chemical process through which each molecule passed the carbon on to the next, and finally to those of the surface: exactly the reverse of what takes place in the manufacture of blister-steel. We find with malleable castings that the centre is hardly affected, and that the carbon from that point decreases until the surface is almost devoid of it. With blister-steel the surface has the highest percentage of carbon, and the centre scarcely any. Chemical affinity of iron for carbon at certain temperatures must cause each molecule to divide its carbon with its neighbor, which would account for the graduation of the carbon from the surface to the centre. The carbon thus is only oxidised on the surface with the making of malleable castings and in "perishing" steel. As carbon only diffuses equally through the mass of iron when it is molten, the graduation is accounted for. "Perished" steel, due to many heatings each of which has robbed it of a portion of its carbon, would be found to be soft on the surface and harder as the centre was reached. Hence the need of protecting steel from the action of carbon whilst red-hot, as far as the operations permit. Cast steel can be welded to iron and to itself where the percentage of carbon is not too high, and much tool-steel will bear welding. Overheating always occurs in welding cast steel, as it must be brought to a heat considerably above its calescence point. To restore the texture of the steel after welding, it should be allowed to get quite cold,



then be heated to calescence-point, and quenched in boiling water, afterwards be annealed, and then again hardened in boiling water. These expansions and contractions (particularly the contractions, as they compress the grain of the steel) will largely restore the toughening texture to the steel. If desired, it can then be hardened and tempered. The whole process of working, hardening and tempering steel will be seen to be a succession of compromises amongst the obstacles to ideal conditions and results; but by recognizing clearly what are the principles employed in doing this, if ideal results are precluded, yet the best attainable are produced and these will be found to be greatly superior to those got by rough-and-ready methods, no matter what experience the worker has had in the practice of such methods. I propose in the next article to give practical directions for employing the principles of hardening and tempering before described in a few typical examples of jobs commonly met with in workshops, and by such means as they usually possess, or are easily procurable.

The accompanying table of steels for various tools, shown by the percentage of carbon in each, the usual temper color, and the temperature at which that color appears, I hope may be found instructive as well as useful.

It will be noticed that although a tool is tempered to the same color as another that requires to be harder, this is effected by differences in the steel-percentages of carbon in the two tools.

(To be Continued.)

Figuring Costs of Welding With Oxy-Acetylene

BY M. KEITH DUNHAM.
Oxy-Acetylene Engineer

The blacksmith, welding with the oxy-acetylene flame, is confronted with the problem of how to make the proper charge for his job. He is using supplies which are costly and unless he has a proper understanding of how to estimate his costs, the balance may be on the wrong side of the ledger. The customer, too, must be educated to the point where he will understand that an hour's labor, plus the use of the welding flame, may be worth \$5 or more against one-tenth that charge on ordinary smithing work.

The first thing to find out is the cost of the gases used. Some manufacturers furnish a table with their apparatus, giving hourly consumption of both gases. As a rule, these tables are very flexible and are subject to considerable variation, particularly as the tip may become larger with use, partially burned or clogged or pressures higher or lower than those given in the instruction book.

If we get at the principle of estimating costs, and understand the how, then it becomes fairly easy to apply the principle to our individ-

ual needs.

Self-Contained Apparatus

In an apparatus generating its oxygen from chemicals and its acetylene in a carbide to water outfit, we must first find out how many cubic feet of oxygen we are getting from a charge in the retort. First ascertain the cubical contents of the holder, that is the tank from which you draw the oxygen and which you will note is equipped with a gauge. If it is easier for you to figure this capacity in gallons, do so. Now with the gauge showing no pressure,

tank in gallons instead of cubic feet, all you have to do is to remember that there are 7½ gallons in a cubic foot. For technical purposes, this result would have to be corrected, but for all practical purposes, it is close enough.

The cost of generating acetylene cannot be done in this manner, since it is dangerous to allow acetylene to a pressure greater than fifteen pounds. We must in this instance take somebody's word, since we have no meter to measure the gas. Fortunately, this is not difficult, since

Tool	Carbon Percentage in Steel	Temper Color	Color Temperature Fahr.
Axe	0.60 to 0.70	Dark Purple	550
Stone Axe	0.80 " 0.85	Dark Straw	500
Broad Axe	1.15	Dark Purple	550
Plier Bites	1.00 " 1.10	Dark Straw	500
Carver	1.00 " 1.10	Dark Blue	570
Stone Boring Bit	1.10 " 1.18	Medium Straw	460
Auger Bit	0.50 " 0.65	Light Purple	530
Milling Cutter for Iron ...	1.20 " 1.25	Medium Straw	460
Milling Cutter for Brass ...	1.20 " 1.25	Very Light Straw	420
Chipping Chisel	1.10	Dark Purple	550
Chisel for Hot Iron	0.60 " 0.70	Dark Purple	550
Cold Chisel	0.85	Light Purple	530
Lathe Centre	0.80 " 0.90	Light Purple	530
Screwing Taps	1.20 " 1.22	Medium Straw	460
Scraper for Iron	1.30	Dead Hard	
Lathe or Planer Chisel	1.20 " 1.25	Light to Medium Straw	430 to 460
Twist Drill	1.20 " 1.22	Dark Straw	500
Files	1.20 " 1.30	Pale Straw	420
Pipe Cutter	1.20	Medium Straw	460
Anvil Face	0.85 " 0.90	Splashed Red-brown	510
Hammer, Blacksmith's	0.67 " 0.78	Splashed Red-brown	510
Hammer, Machinist's	0.90 " 1.00	Splashed Red-brown	510
Grips	0.85 " 0.90	Purple Blue	529 to 531
Woodworking Knife	1.15 " 1.20	Dark Purple	550
Hatchet	1.15 " 1.22	Splashed Red-brown	510
Saw for Steel	1.60	Medium Straw at Teeth ...	460
Saw for Wood	0.80 " 0.90	Dark Blue	570
Springs	0.90 " 1.25	Very Dark Blue	601

TABLE SHOWING THE STEELS USED FOR VARIOUS PURPOSES, THE CARBON CONTENT, THE TEMPER COLORS AND THE TEMPERATURES AT WHICH THESE COLORS APPEAR

place a determined charge of chemicals in the retort, say ten pounds which costs \$2.00. Fully "cook" this, allowing every bit of oxygen to pass off into the tank. When the oxygen has entirely passed off from the chemicals, note the gauge pressure, which let us say, shows 150 pounds. Now, let us assume that the cubical capacity of the tank is four feet or thirty gallons. For each atmosphere of pressure (15 pounds) we have increased the cubic feet of oxygen, its (the tank) own capacity,—that is at fifteen pounds we had four feet, at thirty pounds, we had eight feet, etc., so that at 150 pounds, we have ten times (ten atmospheres) four feet or forty cubic feet from ten pounds of chemicals costing \$2 and our oxygen has cost us five cents per foot. If you have figured the capacity of the

the carbide is practically of one grade and differs only in sizes,—the smaller sizes producing the least gas. A properly constructed generator, using lump carbide, will give off about four cubic feet of gas to the pound and if our carbide costs us \$4 a hundred pounds, our acetylene is costing us one cent per foot.

With these two facts more or less determined, we are ready to make the torch test,—to find out how much of each gas the torch uses and from then on our method of figuring costs becomes simpler. Such a test may be conducted in the ordinary course of your welding work—in fact this is the better way, since what we want are actual results and not theories. If the acetylene generator for instance, is a twenty pound one, you can figure on getting eighty cubic feet of gas from the



twenty pounds of carbide. Note carefully the gauge on your oxygen holder *each* time you allow the gas to come from the retort—this is the only way you can find out how many cubic feet of oxygen you are using. If the cubical capacity is four feet and if the gauge pressure shows 150 pounds, then you have already learned that it contains forty feet. Keep a record of just how many times this oxygen tank must be charged to 150 pounds to use up the 80 feet of acetylene from the generator. It is just possible that you may have to charge it only twice, in which event your torch would be using equal proportions of each gas; but it is very probable that three times will be a closer estimate, in which case your torch is using $1\frac{1}{2}$ feet of oxygen to one foot of acetylene or a ratio of 1.5 to 1. Once this ratio of the torch is established, whatever it may be, it is only necessary from there on to keep a record of the oxygen gauge to find out costs of gases. For example, at the start of a job, the gauge registers 150 pounds on the size tank given above. At the finish, it shows fifty pounds, a difference of 100 pounds, or $6\frac{2}{3}$ atmospheres. As there are four feet for each atmosphere, you have used $4 \times 6\frac{2}{3}$ or $26\frac{2}{3}$ cubic feet of oxygen and as you have already established the ratio of consumption of your torch, it is very simple to estimate how much acetylene has been consumed. As you have previously ascertained how much the oxygen is costing per foot and that acetylene may safely be figured at about one cent, you may quickly arrive at the cost of the gases.

Tank Oxygen and Acetylene Generator

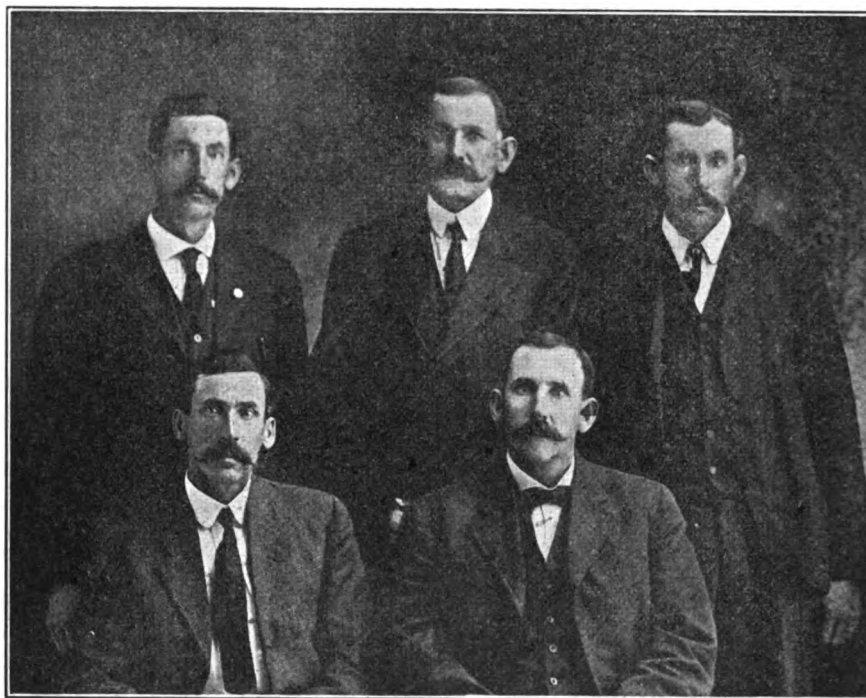
The use of oxygen in cylinders considerably simplifies the method of ascertaining costs. You know what you pay per foot for the gas, F. O. B. the factory and to this price, you add freight or expressage; so that we will say the cost with all these items is four cents per cubic foot in your shop. The commonly used size is 100 cubic feet, under a pressure of 120 atmospheres, or 1,800 pounds, though it is just as easy to figure costs with a 50 or 150 foot size as it is with the 100. It is necessary, of course, to have a high pressure gauge and this gauge should be a part of the oxygen regulator. Likewise it is necessary that this be of high quality, since a cheap gauge will give wrong readings and is besides dangerous to use. The calibrations on the dial of this gauge may be in atmospheres,

pounds or percentage. It makes no difference how the dial is marked, if you but remember that one atmosphere equal fifteen pounds and that the tank is full at 120 atmospheres or 1,800 pounds. If we start a job with the gauge reading 120 atmospheres and finish with the gauge reading 80 atmospheres, we have used 42 atmospheres, or one-third of the contents of the tank. If the cylinder is a 100 foot one, we

tion previously given, we find we have used $83\frac{1}{3}$ feet of oxygen and as we are using a third more oxygen than acetylene, roughly we have used 55 feet of acetylene, and with oxygen at four cents and acetylene at one cent, the total cost of our gases has been \$3.87.

Tank Oxygen and Tank Acetylene

Those outfits using acetylene in cylinders are very easy to figure costs. Here, we have to take no one's



THE PETTIGREW'S—A FAMILY OF BLACKSMITHS.

JOHN R.
THOMAS

JOE J.
WILLIAM

BEN F.

have then used $33\frac{1}{3}$ feet of oxygen. At any time, to find the contents of the cylinder, the following equation is used:

Size of Cylinder	times	gauge reading
100'	x	80 atmospheres
		120 atmospheres

divided by pressure when full, equals contents of the cylinder.

This may appear a little bothersome at first, but as a matter of fact it is quite simple and you will quickly get familiar with it. As with the self contained apparatus, we must find out the ratio of consumption of gases with the welding torch in order to find out how much acetylene is used and thereafter, it will take but a moment to figure the cost of gases of any job.

Suppose for instance, that we have found that our torch was using $1\frac{1}{2}$ feet of oxygen to each foot of acetylene and that we start on a job with a full tank of oxygen and finish with the gauge reading 20 atmospheres. By applying the equa-

word for cost of gases. The oxygen, of course, is figured exactly the same as in the preceding case and we can get our ratio of consumption of the welding torch by starting to weld with a full oxygen tank and weighing the acetylene cylinder. At the finish of the job, again weigh the acetylene tank and the difference in weight in pounds times 14.5 (the number of cubic feet of acetylene to the pound) gives us the amount of acetylene used, the cost per foot of which we figure the same as tank oxygen, adding the express or freight to the price we pay the manufacturer. So that using tank gases, it is a very simple matter to find out the consumption in the welding torch of each gas, and thereafter costs may be figured merely by noting the oxygen gauge at the start and finish of each job. In this connection, however, it is pretty good policy to weigh the acetylene cylinder when received and again when empty for quite another rea-



son,—to see that you are not over-charged.

It takes much longer to read this than it will to do it, and while the methods explained may be rather difficult to grasp on the first reading, go to it again until you get hold of the idea. The oxygen gauge is, as you can see, the tell tale of your costs of gases.

Welding Rods and Supplies

You may keep a record of the welding rods used on your different jobs by becoming familiar with how many of them make a pound and thereafter keep track of how many you use on the job and then estimate the cost. Too much system is, of course, worse than none at all and an exact figure, to the ounce, is not at all necessary. Fluxes may be figured in the same manner.

Labor

A good acetylene welder is worth at least \$25 a week—there are many positions open for extra good ones at figures higher than this. Therefore in figuring costs, your labor should be placed at fifty cents an hour minimum.

Overhead

After all expenses are taken into consideration, there is that one very important item, overhead. In oxy-acetylene welding, this overhead is particularly high, as no matter how expert you may become, there are always jobs upon which you will fall down and others that you will have to do more than once before you succeed. You can't charge a man anything for a job upon which you have been unsuccessful and it isn't fair that you stand the loss yourself—nor is it good business. Therefore, the cost of these failures and semi-failures must be spread around. So we must add this cost to our successful jobs. In quite a broad experience with repair shops, the writer has found that it is not safe to figure this overhead at less than 100%. To bluntly show your customer that you are adding on 100% to the cost of his job is not very good policy, so perhaps the best plan is to add this percentage when figuring your job, that is, if your oxygen costs four cents, figure eight cents, if the acetylene costs two cents, put down four cents, etc. Following is just a general idea of how to figure the entire costs. These costs may be kept on the well known slate of the blacksmith shop or a written or typewritten slip made out. The chief thing is to keep them:

Oxygen gauge, start,

Oxygen gauge, finish,

Cubic feet of oxygen used, @ 8 cts., (100% added),

Cubic feet of acetylene used, @ 4 cts. (100% added),

Welding rods, pds. @.... (100% added),

Labor, preparing, @ 50 cts. hour,

Labor, welding, @ \$1.00 hour,

Labor finishing, @ 50 cts. hour,

Profit, 25%,

Total charge.

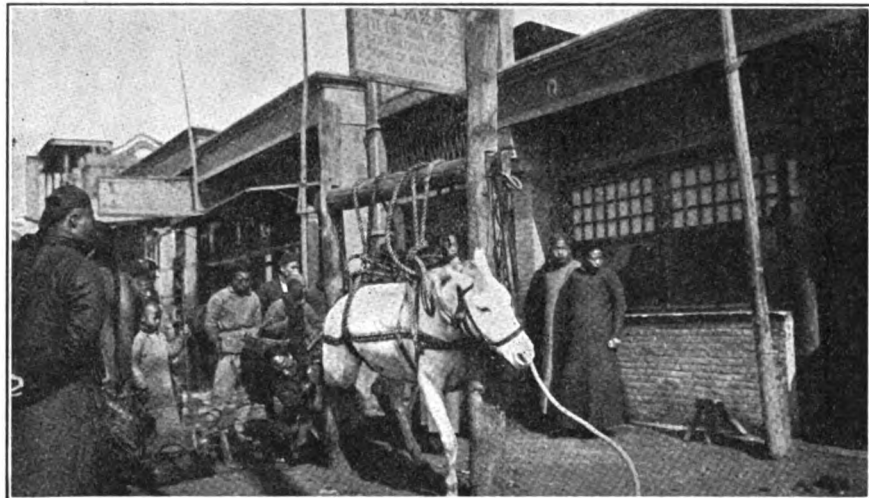
Of course, you can add to this as you may deem fit. Perhaps you are using charcoal to preheat, or want to charge up asbestos paper destroyed or fluxes used. The primary consideration is to get your gases properly charged and your labor.

Now, just a word regarding prices. It is pretty good policy, after you have become familiar with the system and can do good work, to make your price in advance. In this manner you will avoid argu-

situations are treated in other lines.

A steamship at sea breaks her propeller and is absolutely helpless. Another ship comes along and throws her a line. After days of towing, she brings her into port. The price for this towing is not made on the basis of how much coal was used in the towing job, but on the value of the ship which was saved. Suppose that ten or fifteen miles from port, the hawser broke and no more lines being obtainable, the ship which did the towing for so many miles had to give it up and proceed on her way. Would she be paid for all the miles she had towed? Not a nickel. She wins or loses—no half way charges—and therefore the remuneration is justly based on the value of the ship which is salvaged.

How much different is this case than taking a smashed crank shaft, broken crank case and wrecked cylinders and making them as good as new? Not a bit. Therefore, make your charges on this character of



THE CHINESE HORSESHOER AT WORK SHOEING A VICIOUS ANIMAL

ments after the job is done and can undoubtedly get a higher price if the customer is properly handled. In estimating any job, always take into consideration the cost of a new part. If it is an aluminum case, for instance, costing \$65, and has a couple of broken lugs which will cost to do \$3, get as much as you possibly can, depending upon how badly your customer wants the work, how quickly he may obtain a new part and how much competition you have. If you can get \$25, get it and don't think you are cheating for you're not. Remember if you fail you get nothing and if your customer doesn't think this method is right and just (or if you don't) call to mind how similar

work on the basis of the value of the article welded, but this remember carefully, if you would preserve the friendship of your customers, do it without letting them know it, whenever you can possibly do so.

Welding Scrap Nickel Anodes by Means of the Oxy-Acetylene Torch

Some important experiments in the welding of nickel anodes by the oxy-acetylene process have just been concluded in the plating department of The Prest-O-Lite Company, at its Indianapolis plant. As a result of these experiments and tests, worn nickel anodes which have pre-

viously been scrapped and sold at less than half price are now being reclaimed at a saving of more than 100 per cent.

The anodes used by The Prest-O-Lite Co. are castings of 90% nickel, 8% carbon and 2% iron. They are elliptical bars, approximately 1½ in. by 3½ in. cross section and 30 in. long and weigh about 30 lbs. Their market value varies between 46c and 50c per lb. On the basis

In view of the fact that this test was made before any experience in the operation had been gained, it is apparent that better results and greater savings are sure to be the result of practice.

The method of handling this operation is about as follows: As the anodes are eaten away by the solution they are turned over to an oxy-acetylene welder who "tacks" on scraps of old anodes by welding to

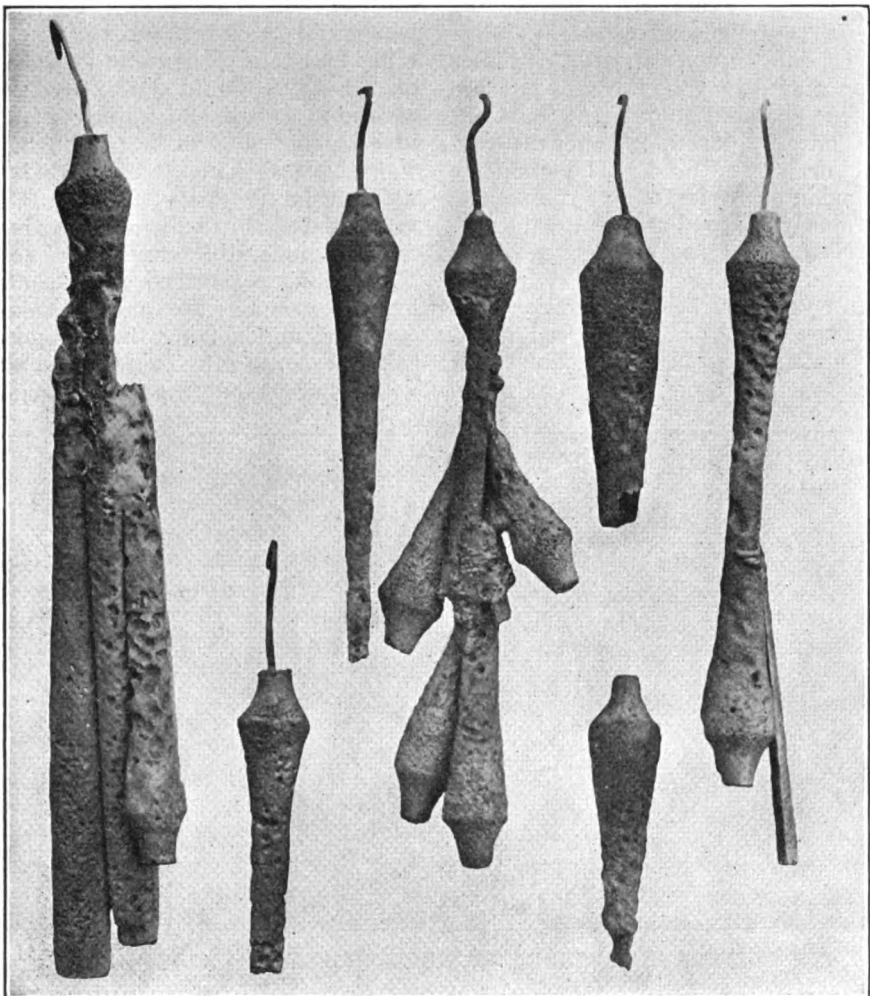
No flux is employed as this has been found to be unnecessary. The pieces of scrap are simply melted on or "fused" together, using another piece of nickel as a filling rod.

The welding process is a great benefit in obtaining perfect fusion, which is essential as all joints must have electrical conductivity equal to that of new anodes.

Another great advantage is the fact that no skill or experience in the art of oxy-acetylene welding is required to weld up these anodes,—in fact, any workman with average intelligence can do the work without any previous knowledge of the process. The apparatus required to do the work is inexpensive.

Many previous attempts have been made to utilize scrap nickel anodes, the most common practice being to drill holes through several pieces and bind them together by means of lead rivets. This method depends upon the contact of the wire or rivet and the piece of scrap to conduct the current and is, therefore, of uncertain value and in many cases, a flat failure. If, for any reason, the contact is bad and offers too much resistance to the current of electricity, the metal might or might not dissolve. Therefore, by using the welded anodes as much scrap may be used in a tub as is desired without any danger of depleting the solution of metal.

The welding process solves an important problem in the nickel plating industry as hundreds of tons of scrap nickel anodes can now be utilized at the same value as new anodes and at trifling cost.



THE NICKEL ANODES FROM THE SCRAP PILE ARE MADE AS GOOD AS NEW BY OXY-ACETYLENE WELDING

of the latter price, each 30 lb. anode has a value of \$15.00.

By welding up old anodes which have been in the solution, and which have a junk value of between 22c and 25c per lb., The Prest-O-Lite Co. is now converting its entire pile of scrap nickel into what are practically *new anodes* at a total cost for gas and labor of *less than 6 cents per lb.* This estimate is based on a recent test at Indianapolis, in which 421 lbs. of scrap anodes were welded up at the following costs:

463 cu. ft. oxygen (@ 2c)	\$ 9.26
480 cu. ft. acetylene (@ 2c)	9.60
24 hours labor (@25c)	6.00
Total	\$24.00

increase the surface. One, two, three and sometimes four pieces of scrap are welded on, depending on the size and weight desired.

The welding flame is also employed to remove the brass hooks which are used to support the anodes while in solution. Under the intense heat of the oxy-acetylene flame (approximately 6,300°F.) the solder melts away rapidly leaving a pure nickel bar which is later welded up.

Thus, by the addition of from, say, 5 to 15 lbs. or more of scrap nickel, a brand new anode is manufactured at trifling cost and every bit of scrap is utilized without the loss of a single pound of metal.

Some Historic American Vehicles

The ingenuity of the early American carriage builders in doing fine work with crude tools and very crude appliances is a remarkable attestation of their native and latent skill and capacity. They virtually entered an untrodden field and essayed tasks in the execution of which our admiration is commanded to this day. The planer, woodworker, blacksmith, machinist, carpenter and wheel-wright, each and all, contributed their respective parts to the future carriage and to the perfection of the handicraft of the carriage builders.

From data collected by the secretary of the Carriage Builders' National Association we present some interesting facts concerning some of the earlier vehicles made in this country:



The Conestoga Wagon

The widely separated communities scattered over Pennsylvania first suggested the Conestoga wagon. One of its peculiarities was the decided curve in the bottom, of a canoe shape, the object of which was to prevent the freight from slipping too far to the front of the wagon when going down hills, or too far to the rear when going up hills.

This wagon received its name from the fact that the horses which hauled the earliest wagons were bred in the Conestoga Valley in Lancaster County, Pennsylvania, as well as from the fact that the earlier wagons were made there. It was an animating sight to see five or six highly bred horses, half covered with bear skins, or decorated with gaudily fringed trimmings, surmounted with a set of fine-toned bells, with bridle adorned with fancy trimming, moving over the ground with brisk, elastic step, as if half conscious of their superior appearance, dragging their heavily laden caravans swiftly over uneven mountain roads.

General Washington Coach

General Washington caused quite a sensation near the close of the 18th century, when he traveled through several States in a coach of magnificent construction.

In 1810 the Pennsylvania Legislature passed a law, imposing toll charges on every chair, chaise, etc., with one horse and two wheels, and on every chair, coach, chaise, stage wagon or light wagon with two horses and four wheels that should use the turnpikes.

The "Jitney" Busses of the Eighteenth Century

In 1744, stage wagons ran between New Brunswick and Trenton, N. J., twice a week. In 1750, a line was established between Jersey City and Perth Amboy. In 1751, a line was established between Perth Amboy and New York. In 1756, the trip could be made from New York and Perth Amboy to Philadelphia, via Trenton, N. J., in three days. This is the route taken by Benjamin Franklin when he made his famous boyhood journey from Boston to Philadelphia.

Coach lines were also established between Boston and Providence and between Boston and Salem, Mass. Stage lines were opened from Albany, New York, westward in the early years of the last century and the distances traversed ranged from 300 to 400 miles. Similar lines were established between Baltimore and Wheeling, W. Va., which distance

was made in gradually reduced time, and as many as fourteen coaches started out at one time, following each other, and carrying over one hundred passengers. The incentive to increased speed was the carrying of the United States mails.

In 1830 coaches had reached the Far West. They were great, ugly, inconvenient vehicles, built with an eye to service, and without any thought of elegance. The wheels were made of oak, with spokes like Polynesian war clubs, thickly tired, with a hub like a beer keg. Upon the axle trees, a common cart body was placed, with seats laid across. There was no pole to the coach, but a pair of shafts. A rough board behind, fastened to the coach by a pair of leather straps, served to hold the baggage of the passengers. It was a coach of this type which carried the famous sign "Pike's Peak or Bust".

In 1870, a New York coach builder built for President Grant a carriage for his personal use which cost \$1,200. It presented interesting features as to excessive height and general design. The body was raised above the axles on exceedingly high springs, which elevated the seat and the occupants, who were carried at a height considerably above the passengers of other vehicles used in the streets. President Grant frequently made use of this carriage in riding out with Mrs. Grant and in taking his sons out for an airing. The vehicle provided room for four persons, although two or three more could be crowded in. It was sold shortly after the death of General Grant, and is still in existence, the property of an American carriage builder. The carriage was regarded as a fine specimen of the specially designed, custom made vehicle in its day and generation.

Thoughts on Timely Topics

BY THORNTON.

Canstic Censure and Cheery Comment

ELECTION IS OVER and our gr-r-rand and glor-ee-us country has been saved in several thousand different ways and spots. And so we can go about our own particular business again with nothing more serious to talk about but war, death and taxes. And so let us get back into harness again with a sigh of thankfulness that we will not again be called upon, at least for a year, to patiently listen to the pre-election promises of pre-election candidates who profess an unusual keen interest and unprecedented re-

gard for the affairs of town, county and state and who with much bluff, bluster and blow insist upon their fitness to fill the particular office which they are seeking. And for freedom from this—well—let us be glad.

CHRISTMAS seems 'bout the most timely topic that can be mentioned in this column this month. And when you mention Christmas you think of the children. If there ever was a day on God's good earth that was 'specially intended for children, it is Christmas. And how different are the Christmases of today than those of years ago when you and I were small. (I didn't say boys there, because I'm still a boy, despite my gray hair). And we were, it seems to me just as happy those days. We didn't get as many presents as the boy of today. We didn't find any electric trains in our stockings, nor any of the expensive contraptions of today. But the warm woollen mittens or muffler and the orange and candy we did find seemed to make us just as happy as the child of today. Were our children to get just the things we got at the Christmas time of our youth their noses would go up so high they'd get rained into. But then times have changed and the big folks and little folks with them. Let us be thankful that we can do what we can for the little folks while they are little—that what we do is all too little while they are small, for the days are not long before they are up and away and into the cold, gray actualities of life.

AND THOUGHTS OF CHRISTMAS bring us to a realization that New Year's will son be upon us with its bumper crop of resolutions. A New Year's resolution arises on the morning of the first day of the New Year with a strength that would do Samson of old credit. For the first day of its life it goes about bragging how strong, verile and powerful it is. The second day of its existence, when its owner is again getting back into the harness of work, the resolutions begins to weaken in the knees, and on the third day it is usually floored for the count and entirely down and out.

There are, of course, all kinds of resolutions made at this time of year. Some men resolve to stop smoking and do really stop it until as late as the fourth or fifth of January. Then they continue the old habit only to save their own reason and to protect the family from

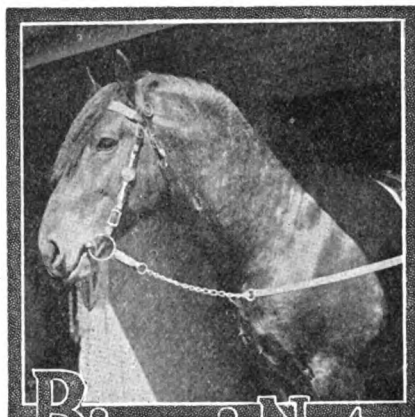


their crabbedness. Other men determine on January 1st, and after a most eventful New Year's eve, that they will not touch another drop of anything stronger than tea. This resolve, in the language of the initiated, is "Climbing on the wagon". And on New Year's day, figuratively speaking, the large spacious accommodations of the water wagon are sorely taxed and, figuratively speaking very much crowded. In fact, some men point to the crowded condition of the water wagon as an excuse for not attempting to board it. But after a week the rush for accommodations becomes less pronounced and after two weeks—the second one being merely an endeavor to revive interest in a dead horse—the parlor suits of the Water Wagon Co., Inc., are offered at reduced rates with ginger ale and lemon pop service free.

Nothing has yet been invented that will guarantee to keep a big, husky, New Year's resolution alive and fighting for longer than the first of February—the ability of Edison, Ford, et al., notwithstanding. Perhaps someday a Marconi or a Wright will offer the Lodge of New Year Resolution Makers a wireless or a heavier-than-air contraption that will make a New Year's Resolution stick tighter than new flannels on a warm day. Of course, that will be going some, but where there are resolves there is hope.

THE ELECTRIC BLOWER is one of the greatest inventions of the age. It makes the blacksmith's life about as soft as the head of a high school student whose main ambition in life is to some day catch up with this country's production of cigarettes. The electric blower is a device that starts to buzz at the mere touch of its funny bone and it doesn't stop until properly switched. In which respect it differs somewhat from the characteristics of the misguided son of indolence who has to be properly switched before he will work. Attached to the electric blower is a device known as a speed regulator or controller. This little attachment enables the blower to perform through a most versatile repertoire, ranging from the breath of a mid-summer zephyr to the impetuous passion of a Kansas cyclone. About the only individual to whom the user of the electric blower can be likened is the new auto owner who is in the seventh heaven of delight over a buzz wagon that hasn't yet shown its weak points. The only difference is that the user of the

electric blower will continue to be increasingly enthusiastic while the flivver-car owner will some day find the blinding scales of delusion dropping from his eyes. The electric blower is a true shop comfort, a labor saver and—then there are any number of other adjectives that any salesman of blowers will add upon invitation.



Bison's Notes

The Twelve Fast Colt Trotters—Peter Mac and 1916?—Earl, Jr., the Ten-Year-Old Wonder.

In these days when no one expects to cut much of a figure on the mile tracks with a trotter that cannot beat 2:10, it is not so much to be wondered at that the new 2:10 trotters of the year already number almost two score, as it is that more than twelve of them—twelve to be exact—are no older than twelve years. When one remembers the long-continued training it used to take to get a trotter up to beating 2:10, this list of twelve new 2:10 trotters twelve years old or younger, furnishes striking proof of the improvement that has been made in breeding trotters during the past two decades. Among these twelve fast colt trotters there is one two-year-old whose training has been restricted to a few months, as she was not broken to harness until after she was a year old. Among the three-year-olds are some that first wore harness when nearly or quite two years old, so, obviously, it must be the long-continued line of trotting bred an-

cestors back of them that made it possible for a trainer to break them to harness and learn them to trot to records in or below 2:10 in a period of time representing a year or less. How well these precocious trotters of 1915 are bred is well shown in the following table, which gives the name and record of each, with the name of sire and grandsire in the paternal line and the name and size of dam and granddam:

- 1—Volga (two years), by Peter The Great 2:7¼ (son of Pilot Medium, dam, Nervolo Bele, by Nervolo, 2:04¼ (son of Onward 2:25¼) grandam Josephine Knight, by Betterton (son of Geo. Wilkes 2:22) 2:07¾
- 2—Mary Putney (three years) by San Francisco 2:07¾ (son of Zombro, 2:11), dam, Mendociata, by Mendocino 2:19½ (son of Electioneer) grandam Esther, by Express, (son of Endorser, through-bred) 2:05½
- 3—Deroche (three years) by John A. McKerron 2:04½ (son of Nutwood Wilkes 2:16½), dam, Mary Holt, by Teddy Grattan (son of Grattan 2:13 grandam Miss Bee McGregor, by The Conqueror, 2:12¼ (son of Egolist, 2:22¼), 2:07½
- 4—Rusticoat (three years) by Axworthy 2:15½, (son of Axtell 2:12), dam, Dorothy T. by Advertiser, 2:15¼ (son of Electioneer), grandam, Hannah Price, by Arthmorton (son of Hambletonian 10) 2:08½
- 5—Colorado Range (three years) by Colorado E. 2:04¾ (son of The Bondsman), dam, Erivange 2:21, by Prodigal 2:16 (son of Pancoast, 2:21¾), grandam, Ettie Baron, 2:21¾, by Baron Wilkes 2:18 (son of George Wilkes 2:22). 2:08½
- 6—Binland (three years) by Binjolla 2:17¾ (son of Bergen 2:06¼), dam Alice Wren, by Ashland Wilkes, 2:17¼, (son of Red Wilkes), grandam Jenny Wren, 2:17½, by Hailstorm, (son of Membrino Patchen) 2:08¾
- 6—Bacilli, (three years), by Bertini, 2:22¼ (son of Bergen 2:06¼), dam Ban, by Bingara, (son of Bergen, 2:06¼) grandam Kalomine, by Kremlin 2:07¾, (son of Lord Russell) 2:09



SOME PRIZE WINNING HACKNEYS AT A YORK STATE FAIR



- 8—Humfast (three years) by Trampfast, 2:12¼, (son of The Tramp) dam Cabinet's Honor, 2:30, by Parole 2:16 (son of Patron, 2:14¼), rgandam Cabinet, by Billy Wilkes 2:29½ (son of Harry Wilkes, 2:13½). 2:09¾
- 9—North Spur (three years) by San Francisco 2:07¼ (son of Zombro 2:11), dam Mary North, by Wilkes (son of Baron Wilkes, 2:18), grandam Maggie Yeager, by Red Wilkes (son of George Wilkes, 2:22). 2:09¾
- 10—Onward Forbes (three years) by J. Malcolm Forbes 2:08 (son of Bingen, 2:06¼), dam Phoebe

Circuit tracks with a fast and game trotting mare called Lillian R. Finally after trotting to a record of 2:04½ Lillian R. became outclassed, that is, she could no longer win in the class which her record threw her. Captain Shaw, instead of sending Lillian R. to the sale ring disposing of her at auction, sent her to Kentucky to be mated with the famous sire Peter The Great 2:07¼, telling his friends that he had always wanted to breed a world's champion and that he believed he could get one from this mare. In due time Lillian R. produced a filly—that later showed the ability to trot in 2:10—and the following year a colt that was christened, Peter Mac. Last year, as a

10. His maternal inheritance is a stout one made especially noticeable by the game races his dam trotted in her strenuous campaigns. If he fulfills the ambitions of his breeder and owner, Peter Mac will be another bright card for the believers of the excellence of record dams to point to.

In these days of extreme speed two or three campaigns down the line of the big mile-track meetings are as many as the legs of the average trotter or pacer will stand. The strain of racing from two to five heats below 2:08 every week on the bones and cartilages of the feet and the tendons and muscles of the legs is enor-



WHERE THE NEIGH AND THE WHINNEY OF MAN'S BEST FRIEND HAS NOT YET BEEN DISPLACED BY THE HONK OF THE MOTOR CAR

- Onward, 2:12¼, by Shadeland Onward, 2:18½, (son of Onward, 2:25¼) grandam Sentinel Belle, by Grand Sentinel, 2:27¼, (son of Sentinel 2:29¼). 2:09¾
- 11—Henry Todd (three years), by Henry Setzer 2:10¼, (son of Todd, 2:14¼), dam, Nowaday, 2:14½, by Lookaway, 2:22½ (son of Look), grandam Bonnie, by Cattaraugus Boy (son of Athlete), 2:10
- 12—The Exposer (three years) by The Exponent 2:11¼ (son of Bingen, 2:06¼), dam Emma Conductor, by Conductor 2:14¼, (son of Electioneer), grandam Racket, by Egbert (son of Hambletonion 10), 2:10

It will be noticed that everyone of these great colt trotters has for a sire, a horse with a fast record, two being bred by horses with records below 2:05, four others by horses with records below 2:10 and three of the remaining six by horses with records below 2:15. Only one of the twelve has for a sire a horse with a record slower than 2:20. Furthermore, it may be noted that eight of these twelve colts have three successive generations of record sires in the male line, that is, the sire-grand sire and great-grand sire of each of the eight possesses a standard record. Perhaps that fact has as important bearing on the early development of extreme speed which makes the present generation of trotters.

There is a vast deal of sentiment to be found connected with trotting horse breeding. Every little while something crops up to show that money is of less importance than glory in the real dyed-in-the-wool trotting horse enthusiast. A few years ago Captain David B. Shaw, a wealthy Cleveland man, made two or three very successful campaigns down the Grand

four-year-old the colt was given a breeder's record of 2:10¼ and this year early in the season Captain Shaw, who is seventy-seven years old, drove him a mile in 2:06½. Right after that remarkable performance, Captain Shaw was offered \$35,000 for the colt. Instead of selling him, as many men would have done, Captain Shaw thanked the man who made the offer, saying that while he realized that the amount offered was a very large sum to refuse for any horse, he expected to see the colt capture the world's record for trotting stallions in 1916, and that to own a champion of his own breeding would be worth twice thirty-five thousand dollars to him. It was sentiment that led the Cleveland man to turn down an offer of that kind for Peter Mac. Later in the season Captain Shaw reduced the world's wagon record for trotters driven by an amateur reinsman over a half-mile track to 2:07¼ with Peter Mac and still later he reduced the world's record for amateurs to cart to 2:06½. At Lexington Ky., some three weeks later the veteran amateur drove the colt a mile to sully in 2:03½ so that his ambition to see the son of Peter The Great in possession of the stallion crown in 1916 does not seem to have been so much of an idle dream as some horsemen regarded it when it was first made public, indeed not a few good judges think Peter Mac might have come dangerously near capturing the stallion record this year had he been specially prepared for that purpose and driven by a professional reinsman. Peter Mac has not yet been started in a race, but he will be entered in the classic early closing events for 1916 and make a campaign down the Grand Circuit. As before stated, his sire is Peter The Great, 2:07¼ and his dam is Lillian R. 2:04½. She was sired by J. T. 2:12¼, a grandson of Director 2:17, while his second dam was Maud, by Garibaldi, son of Hambletonian,

mous. Only horses exceptionally well-equipped in those respects continue sound after a couple of campaigns, for, as almost everyone conversant with the troubles of the trainers knows, it requires only a trifling unsoundness to turn a horse from a winner into a loser. In view of these facts the campaign of the famous old gray pacer, Earl Jr., has been making this year is little short of wonderful. This iron-sided pacing grandson of Mambrino King, once upon a time referred to as the "Dude Stallion", is now ten years old and his (this year's campaign) is his eighth consecutive racing tour. He first raced as a three-year-old and briefly summarized he has started in races as follows: At three years, nine races; at four years, eight races; at five years, eleven races; at six years, fourteen races; at seven years, ten races; at eight years, twelve races; at nine years, twelve races; at ten years, (1915) eight races. As a three-year-old Earl Jr., took a record of 2:10¼. At five years he lowered it to 2:03¼. At six he cut his record to 2:02½ and at seven to 2:01½. There it still remains, but a couple of weeks ago at Lexington, this ten-year-old stallion equalled his record of 2:01½, gained three years ago in a training race and, what is more wonderful still, he was started again four days later and won again, being one of the only two horses to win two races in one week at this meeting where only the top-notchers gather. Earl Jr.'s sire, The Earl, was bred at Village Farm, East Aurora, N. Y. He was sired by Mambrino King, dam Princess Royal 2:20 (dam also of Ess H. King 2:00¼) by Chimes; next dam the famous Estabella (dam of Heir-at-Law 2:05¼, etc), by Alcantaro 2:23. He was first trained at the trot and took a record of 2:17. Then he was sold to an Illinois man who converted him to the pacing gait and gave him a record of 2:14½ at that way of going.



Stop Yer Kickin'!

Stop yer kickin' 'bout the times;
Get a hustle on you;
Skirmish 'round and grab the dimes
Ef the dollars shun you.
Croakin' never bought a dress,
Growlin' isn't in it;
Fix your peepers on success,
Then go in to win it.
Times is gettin' good again—
Try to help them all you kin.

Don't get 'round with hangin' lip
That is sure to floor you;
Try to get a better grip
On the work before you,
Put some ginger in your words
When you greet a neighbor;
Throw your trouble to the birds
Get right down to labor.
An' you'll notice every day
Things is coming right your way.

Stop yer kickin' get a hold
Of the wheel and turn it;
You can never handle gold
'Less yer try to earn it.
Brush the cobwebs from yer eyes,
Stop yer durn repinin',
An' you'll notice that yer skies
Allus 'll be shinin'.
If you hain't the nerve to try,
Sneak away somewhere an' die.
—Exchange.



Heats, Sparks, Welds

Don't forget to write it 1916 after the 31st of this month.

It is unwise to judge people by their own opinions of themselves.

Do you know that every job taken at cost reduces the profit of one profitable job about 50%?

Of course a smith can repair spring buggies and wagons in the Fall if he will go out after the business.

Big successes are never made so by feeding on small ideas. Modern equipment is necessary in the modern shop.

When you can see nothing but dark shadows before you, turn round—face the sun and the shadows will fall behind.

Sharper grows competition as the world grows older and the modern business man, if he would grow successfully, must also grow larger.

Sometimes the man who thinks he is busiest, just fusses around and retards the wheels of progress by getting in the way of other folks.

Economy is a fine hobby if not driven to death; but when harnessed with Enterprise the team will reach the goal of Prosperity surely and quickly.

A Very Merry Christmas to everyone of Our Folks. May perfect health and happiness be your biggest portion with enough of wealth to make life sweet.

When you are inclined to give a customer a 2% discount which he does not really deserve, just remember that that discount of 2% reduces a 20% profit a full 10%.

If you have not yet done so, the suggestion will bear repetition and then, too, you will be surprised how bright and cheerful the shop can be made with a good coat of white-wash. Better do it right now while you have the time.

Is your business showing a profit—an actual net gain in real money? If it is not showing a profit of at least 10% of the total amount of business done, you and your shop and your business are not making good in a business way.

Do your customers call you a "Quality Crank" or a "Speed Marvel"? You will get more trade—more trade that is really worth having—by insisting upon work being correct, than you can ever hope for by turning out work with lightning dexterity.

Don't merely wish your neighbor craftsman a Merry Christmas, but help him well along the way toward one by getting him to subscribe to "Our Journal". Make him feel that you really mean your Christmas greeting by handing him a copy of THE AMERICAN BLACKSMITH.

"Are you doing more or less business than five years ago?" we asked our friend, Tom Tardy, and you can well imagine our surprise when he said that not only was he doing less business, but he was getting lower prices in spite of the fact that the cost of practically all materials had advanced during that time.

Isn't there some one thing in which you excel your competitors? There usually is in the case of every business. Look for that one thing carefully. If you find two or three or more, so much the better, but when you find them, make a great big noise about them and then keep right on making a big noise. It may mean the difference between things coming your way and going the way of competitors.

Someone has said that "the man who continues to ignore the benefits of co-operation and organization, is continually buying oil to grease his way to ruin". And is this not particularly true in the smithing trade? When you begin to argue against the needs of a proper accounting system in your shop and business, just remember that it is not what you think you know that fattens your bank account. You will never really know where you stand in a business way unless you have an accounting system to tell the actual facts about your business.

Are you sure that you are getting all you should out of your machine equipment? If you are selling the work of any one of your machines for less than that machine's work costs you, you are not measuring up to the qualifications of

TRUE TALES OF OUR SERVICE Number Twelve.

An Indiana smith opening a new shop and with an eye for the artistic wanted a supply of business stationery—letter heads, bill heads, envelopes, business cards, etc.—that would be neat, attractive and of a design that could be used perhaps in different sizes on all his printed forms. He asked for our help. We planned the printing for him and told him just how his printer could get the results he wanted.

a good business man. It is mighty easy to let the machine's work go for less than actual cost. For example, in a recent investigation in a large manufacturer's plant, a certain machine's work was being sold for less than \$1.50 per hour in spite of the fact that the actual cost of that work done by that machine was somewhat over \$4.00 per hour. Can a business run very long on this basis?

Unprecedented are the value of crops for this year. The harvest of other years have in some instances yielded larger, but never before have crops been so valuable. Never before has the farmer received more money. Never before has the prospect for the farmer's prosperity been so bright. Are you, Mr. Reader, as one of the farmer's most necessary helpers, going to let him "salt" this great big money bag away before you even make an attempt to get that part of it which really belongs to you? If you have not presented bills to your farmer customers, do so today—do it right now. The reading of this page can wait, but tomorrow might be too late to get your money.

Have you laid plans for next year? Think hard on the past year's performances. Think what the past year has done for you and the craft. Consider the changes that have taken place. Make a note of the things that have occurred, and with the past year's facts before you, plan your business campaign for the coming year. Even if you do not work out all of the plans you make, it will give you something definite to work for. It will point out to you the harbor for which your ship of business must be steered. Without some goal, some port in view, no ship ever made real progress. Therefore, plan your 1916 business activities with something definite in view.

How anxious are you to succeed? Are you willing to pay the price? Are you willing to do the things that you don't like to do, but which you know are necessary in order to make you, your business, and your shop a real success? The matter of success or failure is more a matter of wanting and desiring, than it is a matter of circumstances. If you want success hard enough and are willing to do the things necessary to get it, there is nothing that can keep it from your door. The number of smiths who are unwilling to do the things that are necessary in order to attain success for themselves, for their business and for their shop, are all too many. Success does not come from a discussion of the war and of local politics, nor by calmly warming the end of a shoe keg and merely think about it. Of course, you want success, but do you want it hard enough to do the things that are necessary to attain it?



Our Honor Roll

EXTRA! EXTRA! NEW NAME IN SECOND PLACE.

A new name appears in second place on Our Honor Roll this month—Mr. James A. Torrey, of Massachusetts. Mr. Torrey is a general smith, shoer and vehicle builder and does auto repairing. He runs a big shop. When sending in his renewal Mr. Torrey wrote: "I need the paper as much as I need a bed to sleep in." And Mr. Torrey's subscription is paid up to December, 1915.

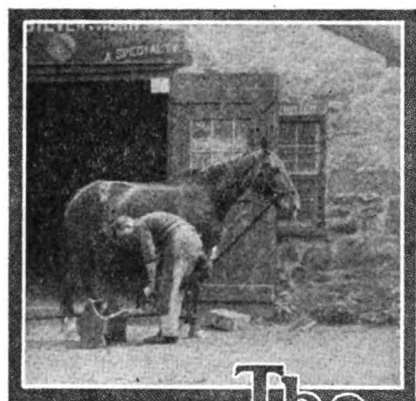
If you are not on Our Honor Roll—get on now. You'll never be able to save so much as you will right now. The sooner you take advantage of our long-time rates the more money you will save. And you cannot take advantage of these low rates sooner than NOW—DO IT TO PLEASE YOUR POCKET BOOK.

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2 yrs.	\$1.60 save \$.40	\$2.00 save \$.50	10 sh. save 2 sh.		
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4 yrs.	2.50 save 1.50	3.20 save 1.80	18 sh. save 6 sh.		
5 yrs.	3.00 save 2.00	3.75 save 2.50	1 £ save 10 sh.		
10 yrs.	5.00 save 5.00	7.00 save 5.50	1 £ 14 sh. save 1 £ 6 sh.		

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no better time than NOW.

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The Horseshoer

Breaking and Training Colts

PART II.

V. G. STAMBAUGH.

Handling and Trimming a Horse's Feet.

If the owner will accustom a colt to having his feet handled at the same time he is broken to lead—that is, before he is weaned—much future work and trouble will be avoided. Untrimmed hoofs usually grow long and uneven, and a crooked foot, or worse, a crooked leg, is the result. Failure to regulate the length and bearing of the foot may make a straight leg crooked or a crooked leg worse, while intelligent care during the growing period can greatly improve a leg that is crooked at birth. If horses' feet were properly cared for, there would be fewer knock-kneed, bow-legged, pigeon-toed, cow-hocked, interfering, and paddling horses.

When picking up a colt's foot teach him to stand on three legs, and not to depend on the one holding up his foot for the fourth point of support. When handling a colt's feet begin with the near front foot. Tie a rope around the pastern, grasp the rope close to the foot, push gently against the shoulder, and quickly lift the foot. The lifting of the foot must be simultaneous with the weight shifting to the other feet. Gentle the foot and leg and let it down. Repeat several times and then trim and level the hoof.

To raise a hind foot, put on a rope as on the front foot and draw the foot forward. To put a rope on the hind foot of a wild horse, tie up a front foot, have the assistant hold his hand over the eye on the same side as the foot to be lifted, or take the headstall in one hand, the tail in the other, and whirl the horse until he becomes dizzy. While in this condition he may be handled with

safety. Lift the foot forward two or three times and gentle it. As soon as the horse gives in, carry the foot backward into a shoeing position and trim the hoof.

To handle the feet of a horse that will not stand still, or that kicks, a halter twitch is a great aid. (See Fig. 3.) This twitch is easily applied and needs only the ordinary halter and tie rope. Pass the rope over the horse's head just behind the ears; raise the upper lip and put the rope across the gums above the teeth; run the rope through the loop made by passing the rope over the horse's head. The rope should be tight from the halter ring, over the head, under the lip, and through the loop. A few good pulls on this rope should make the horse stand quietly.

For a kicker try the following: Buckle a strap with a 2-inch ring around hind pastern, run a rope through this ring and carry end up over horse's back, tie to opposite foreleg next to the body, and lead the horse forward. When he lifts his foot it may be held up by pulling on the loose end of the rope, as shown in figure 4. The foot may be held either forward or backward with this arrangement. (See also Fig. 5.) The best time to work on a horse's feet is when he is tired from a drive or other exercise.

Breaking to Drive.

After the colt has been broken to lead he may be accustomed to harness and trained to rein. A horse should never be hitched to a wagon or ridden before he is broken to drive in harness; that is, trained to go at command, stop when he hears "whoa," rein to the right and left, and to back up.

To familiarize the colt with bit and harness the "bitting harness," consisting of an open bridle with snaffle bit, check and side reins, and surcingle with crupper, may be used. The bitting harness is shown in Fig. 6.

Put the rigging on the colt, leaving the side and check reins comparatively loose, and turn him loose in a small paddock for an hour. On the second lesson the reins may be tightened somewhat, but not left on for over an hour. The third day driving lines may be put on. Let the assistant lead the colt till he is not frightened at the driver walking behind. Dismiss the assistant as soon as possible, and drive the colt for half an hour in a quiet paddock or lane where he will not see other horses. All that should be taught in this lesson is to go ahead. Cluck

to the colt, or tell him "get up," and use the whip to let him know what is meant.

It is essential to train both sides of a colt. He may become accustomed to objects seen on the near side with the near eye, but when the same objects are viewed for the first time on the other side with the off eye he may be badly frightened. Driving in a right and left circle will facilitate this training.

To Stop a Horse—"Whoa."

The next lesson should be a short review of the previous work and in addition the meaning of "whoa", "Whoa" in horse training is the big word. It doesn't mean back or steady, but stop. Train the horse so that when he hears "whoa" he will stop and stay stopped no matter what is happening.

To stop a horse, say "whoa" so that he hears you plainly, and immediately follow the command with a pull on the reins. The most effective use of the reins is to hold one rein just tight and give a good reef or pull on the other one, then relax the pressure. If the horse doesn't stop, repeat the command and pull. Soon he will stop at the word, and the pull may be eliminated.

To Back a Horse—"Back."

The next lesson should review "get up" and "whoa," and the horse should be taught to back. As

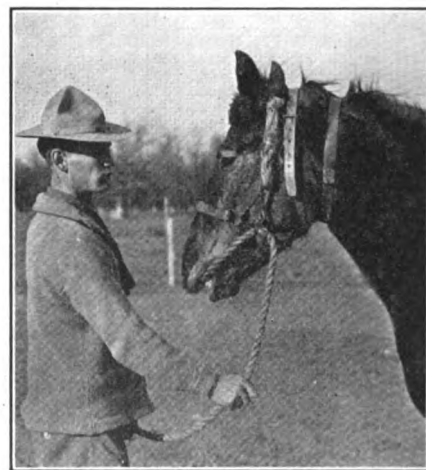


FIG. 3.—THE HALTER TWITCH

a horse should be trained to stop on command, so should he back on the word, and lugging on the lines should be unnecessary.

Drive the horse a few steps to get his attention, stop him, then give the command, "back," following it with a good reef on the reins. If he yields a step, pet him, and then repeat the command with the pull on the reins. Do not exert a continuous



pressure, for if this is done the horse will take the bit and forge ahead. Do not make the lesson too long. Repeat again the next day, and continue lessons until the horse will back on command.

assistant pet the colt until he quiets down, then start again, going a little farther. As soon as the colt gets over his fear drive around in a circle a few times. Stop occasionally and always quiet the colt. Circle in the

at which he is frightened; otherwise a shying horse will result. The daily drive may be increased in length until the colt is broken.

City Sights.

Before the colt is driven in the city or on a road where there is heavy traffic he should be accustomed to such sights and sounds as will be encountered there. If a railroad track is near; where trains pass frequently, or a road with automobile traffic, or a traction engine in action, put on the leading ropes and tie the colt near. As soon as he loses his fear of such sights and sounds at a distance he should be led up to them, if possible, and allowed to make an examination. When he finds that they do not hurt him he loses his fear and may then be driven on busy roads and streets.

NOTE—The third installment of this series will take up Driving Single, Breaking to Ride and Bad Habits.

The Rubber Hoof Pad and Its Uses

W. R. SKINNER.

Firestone Tire & Rubber Company

The days are practically past for a shoer to admit that he cannot remedy the worn-out condition of horses near the breaking-down point. If the customer will but allow him to attach rubber hoof pads the chances are much in favor of the fact that the horse will recuperate within thirty days, so much so, indeed, that the customer will not recognize him as the same animal. He will have a more lively gait, a better rate and will have increased noticeably in weight. For there is nothing that will reduce a horse's

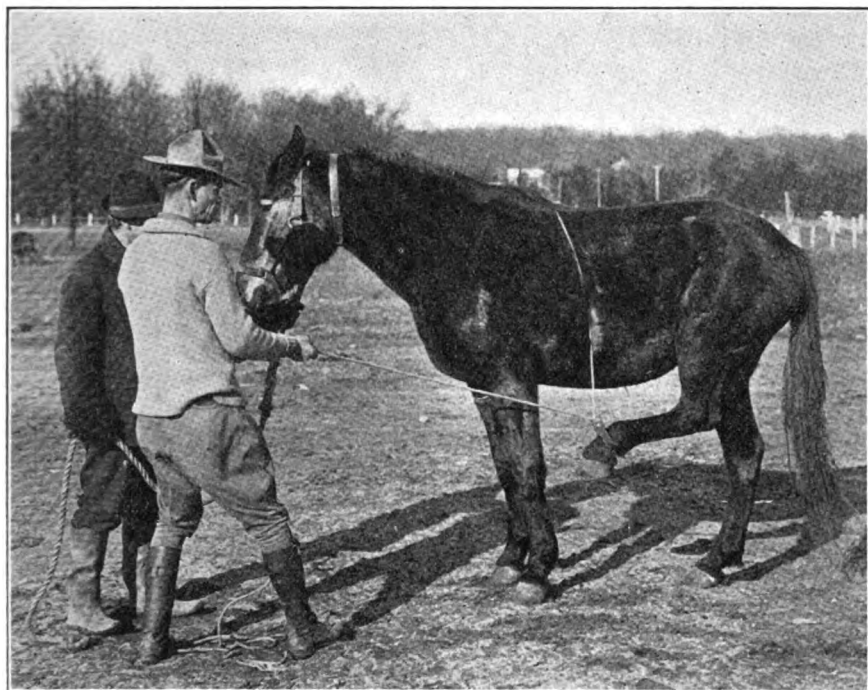


FIG. 4.—RAISING THE HIND FOOT

After the horse goes satisfactorily in biting rig, the work harness with breeching should be substituted. The traces and breeching should be joined loosely together and gradually tightened as the work progresses. This will familiarize the colt with the sensation of wearing collar and breeching. As soon as he goes well with the harness he is ready to be hitched to the wagon or cart, single or double.

Driving Double.

To drive double, use a broken, gentle horse for a team mate, preferably one that the colt knows. Hitch them together and drive around without the wagon, stopping, starting, and backing the team. Thirty minutes should suffice for this lesson.

At the next lesson familiarize the colt with the wagon; lead him up to it, allowing him to smell it. Then rattle the wagon and lead him around it; lead the gentle horse to its place at the tongue, bring the colt up, attach the lines, the neck yoke, and lastly the traces. Hitch the two together. The assistant may now take the colt's lead rope. Drive a few steps and stop, using the brake to prevent the wagon from running up on the team. Let the

opposite direction. When the colt goes quietly the assistant may get in the wagon. Have a short stay chain on the old horse so that if necessary he may start the wagon alone. After the colt goes well a short drive may be taken. Always stop when the colt shows fear of something. Let him look it over and examine it; never whip him or rush by anything

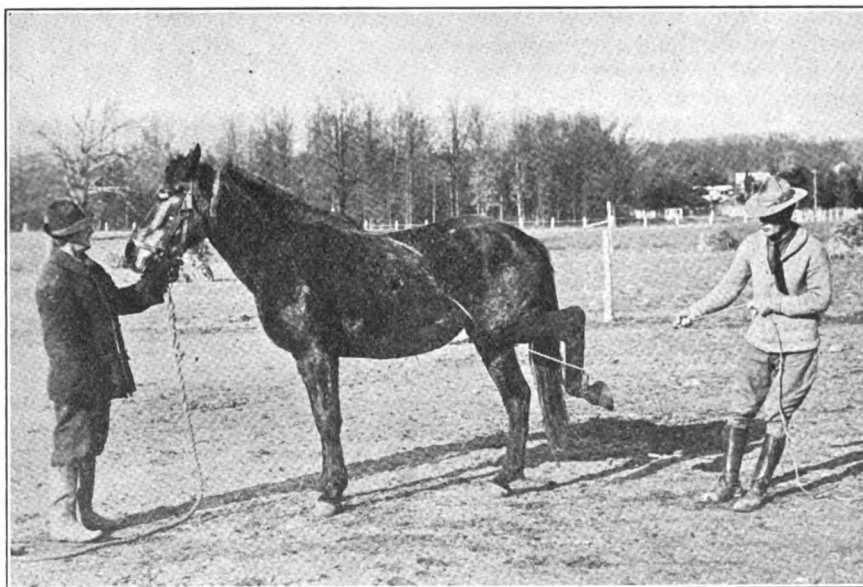


FIG. 5.—HOLDING THE FOOT FOR SHOEING



weight, spoil his gait or slacken his rate so much as sore feet.

Now, just what is the cause of so large a number of sore-footed horses? Perhaps the following answers come to mind: The horse is not shod often enough, or he receives too much pounding from stone pavements, or he contracts corns, or the veterinary surgeon diagnoses his troubles as Navicular disease. Yet you may examine this particular horse's feet and find them in fairly good condition.

But wait a minute. Just run your

what the horse needs. Not but what the bar shoe is a good proposition. For next to the rubber hoof pad it is the most humane shoe that can be put on a horse, and under certain conditions, is the only shoe that can be used.

Now, does the bar shoe obliterate the "jar" or concussion that the foot received? Decidedly not. It does not relieve the "jar" a particle. The concussion that a horse receives is the most vital proposition with which the shoer has to contend. In case he obliterates this concussion

From my own experience I know that they are worth their weight in gold, both from the standpoint of humane treatment of the horse and from the added comfort and pleasure in driving him.

What is Combustion?

PART II.

J. F. SPRINGER

To burn any kind of fuel, whether solid, liquid or gaseous, a certain definite amount of oxygen must be supplied. Thus, it has been ascertained that for 1 pound of oxygen we must furnish 1 pound of oxygen—no more, no less. It is usual to furnish more than is actually required, in order to make sure. Now, while we deal with coke by the pound and ton, we deal with oxygen by the cubic foot. For 1 pound of carbon, we must supply at least 28 or 30 cubic feet of oxygen. We usually get it from the air. Ordinary atmospheric air consists, about one-fifth of oxygen and about four-fifths of nitrogen. The oxygen is the only thing wanted. The nitrogen does not harm and but little good. In order to burn our 1 pound of carbon, we must supply five times 28 or 30 cubic feet of air. That is, we must furnish for every pound of carbon, some 140 or 150 feet of air. This is the reason why the bellows has to be worked so hard. Indeed, in practice as much as 225 to 300 cubic feet may have to be supplied. This needs explanation.

When carbon or any other fuel is burnt, the amount of oxygen actually consumed is perfectly definite. Thus, 150 cubic feet of air really supplies all the oxygen needed to burn the 1 pound of carbon. But there is more or less difficulty of getting all the particles of oxygen to their right places at the moment when wanted. To meet this difficulty, a good deal more than enough is ordinarily furnished. The extra amount is not consumed, but goes off in the smoke, etc.

If natural gas is being employed, more air is needed than in the case where carbon in the form of coke is used. In fact, natural gas requires about half again as much air, the gas and coke being equal in *weight*.

Where fuel oil is the fuel being used, more air is required than with coke, but not so much as with natural gas.

It will be clear from the foregoing that the smith's fire must be fed with great quantities of air. It is important then that the stream of air being fed to the fire be a large one in cross-section or that it be

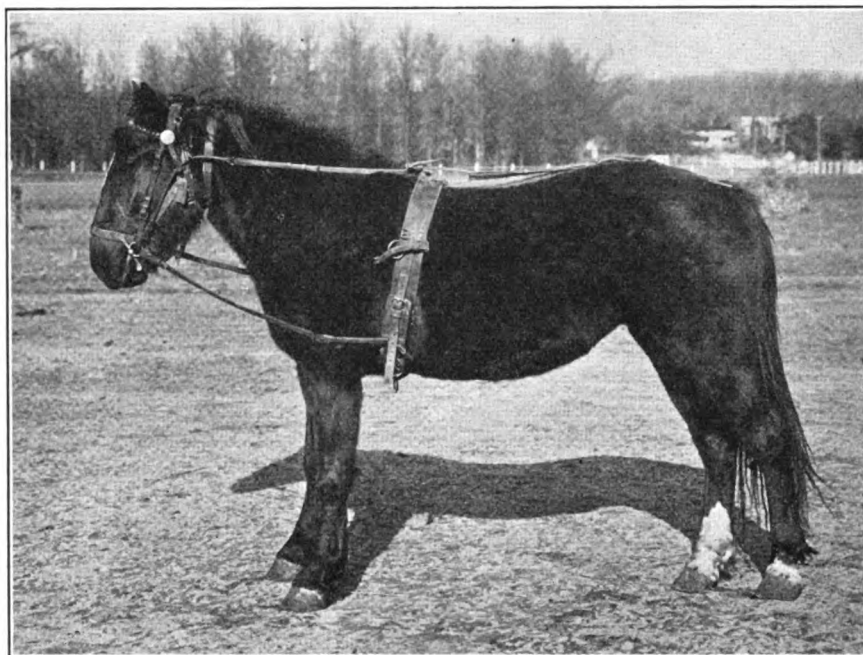


FIG. 6.—THE BITTING HARNESS

hand down his leg, and like as not you'll find splints, or ossifications, or bursa, or sprained ligaments, or glands filled with secretions, Lymphangitis, or Laminitis, or ossification of the lateral cartilages, or ruptured cartilages which latter cause inflammation and pus-filled pockets in his feet. And this, by the way, should be removed from the bottom of his foot. If it is not removed it will ultimately make its way through the sensitive laminae to the coronet and out. This latter action is Nature's method of healing.

Now, Mr. Horseshoer, listen. This is between you and me. Is it not a fact that you have made bar shoes, fitted them the best you knew how, packed them with tar and oakum and covered these fillers with a piece of leather (which both holds in the tar and oakum and also takes the "jar off"), and after all your hard work discovered that the operation was a failure? This remedy doesn't seem to answer the purpose—it isn't

and thereby dispenses with 98% of the troubles hitherto afflicting the horse, he will surely have to concede that a shoe with a toe and two heel calks turned up does concentrate the concussion at the point which is most sensitive and also most liable to disease.

There is scarcely any foot-trouble (provided it can be traced back) whose origin can not be found in concussion. The difference in locomotion as between front legs and hind legs is noticeable. The front feet touch the ground with a striking motion, while the hind feet hit the ground with an angular gliding motion, which motion of itself destroys all chance of concussion. This fact, of course, shows why there is so little trouble in connection with the hind feet.

To sum up this question of sore feet among horses, it is easily seen that the cause is concussion, and the only remedy therefor is the careful application of rubber hoof pads.



moved along rapidly. If we could get rid of the nitrogen in some simple and inexpensive manner, the problem would doubtless be much less difficult.

A word as to steam boiler practice may be included here, as the smith will find in it a lesson for which he may, I think, now and then have use. In recent years, it has been found advisable to increase greatly the effective distance between the fire and the boiler surface. The underlying reason is the fact that if combustion has not taken place *before* the stream of gases from the fire gets to the boiler, it is not likely to occur afterwards. As we have already learned, soft coal gives off hydro-carbon gases. These, if they are to be burnt, must mingle with air and must also have a high temperature. If the boiler is reached before burning takes place, the boiler surface will *chill* the mixture of gases. This will tend to ruin the chance of combustion. So, likewise, when the smith is using soft coal, the volatile part of the coal (the hydro-carbon gases) should ordinarily have time to mix with the air *before* it gets to the work. Otherwise, it may be chilled and never burn. The unburnt hydro-carbon gases may conceivably do some injury to certain classes of work. Accordingly, *distance* from a soft coal fire may often be a good thing.

It may surprise some to know that a chill may stop combustion. The reason is this. In order that a substance may burn, not only must it be supplied with the necessary oxygen, but a certain definite temperature (called the *temperature of ignition*) must be realized. This temperature varies for different substances. A particle of hydrogen, for example, may be just about to unite with the right amount of oxygen; but it will not do so, unless the temperature is at least equal to the ignition temperature of hydrogen. So, likewise, with other substances. A simple experiment, illustrative of the point under consideration, may be performed by means of a tallow candle or an ordinary lamp. When either is lit, hydro-carbon gases will rise. We may put a piece of wire into the flame in such a position as to chill these before combustion. The wire will get a coating of soot. This coating consists largely of what should have been, but which will now never be burnt. If the chill had not taken place, presumably pretty much all of the coating would have been consumed.

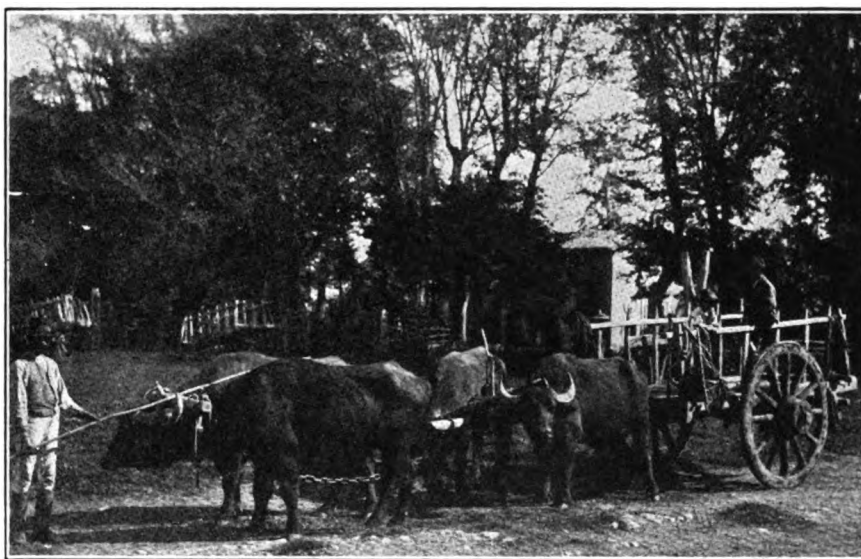
An important matter to under-

stand is the difference between *amount of heat* and *temperature*. We may have a great amount of heat accompanied by a low temperature. A ton of boiling water contains a great quantity of heat; but the temperature is only 212 degrees. On the other hand, the *temperature* may be high while the quantity is inconsiderable. Thus, a white hot inch of No. 10 wire will have a high temperature; the amount of heat involved is quite small.

If we want to inject a good deal of heat into a piece of steel, for

want to heat up six inches of a steel bar to a bright red. We could accomplish the desired result by operating on the middle two inches, heating this part up, say, to a white heat. The result might easily be a ruined piece of steel at the center two inches. Possibly, no good blacksmith would do what I have described. It will serve as an illustration, however, of the principle involved. Excessive concentration of heat should be avoided.

The problem of even heating is, in fact, a most important one—espe-



THIS IS THE QUEER KIND OF BUFFALO-DRAWN CART WITH WHICH THE ITALIAN RURAL BLACKSMITH IS MOST FAMILIAR

example, we may sometimes use a high temperature to do it. This is the manner of operation of the oxy-acetylene torch. The little white flame is exceedingly hot—much hotter than we want the steel to become—but at any moment the *amount* of heat contained is not very great. We can, however, use the high temperature of this flame as a means of quickly pouring heat into the steel and raising the metal to the melting point. The case is similar to that where we want to introduce a good deal of water into a tub by means of a small pipe, the water will have to travel at a high velocity. The velocity of the water corresponds to the temperature of the white flame. It is a very useful thing that we may use a high temperature as an aid in injecting heat into a piece of work. But there is a danger which must be kept in mind. We pour the heat in rapidly at some small locality of the work for the purpose of elevating the temperature of the whole, we may easily *burn* the work at the point where the heat is being poured in. Suppose, for example, that we

cially in the hardening and tempering of tool steel. Some kind of an oven is often used as a means of preventing the excessive heating of spots. There is a further advantage which consists in the prevention of actual contact between the flame and the work. The oven provides a means of raising the temperature evenly at all points of the work—at the thin and the thick places. The temperature of the work will never be greater than that of the oven; so that we may limit the heat to which the work will be exposed. The oven itself is heated by direct contact with the flame, by radiation from the flame, or by both simultaneously. Ordinarily, the parts of the oven should be heavy, so as to distribute the heat and prevent its concentration in spots. An oven may be run by coal, coke, oil or gas.

It will be of interest to have before us some principal facts as to the fuels used by blacksmiths.

Wood charcoal. This fuel, once quite common, is now so expensive as to be used only to a limited extent. It has a high heat value—



ranging from 11,000 to 13,500 B. t. u. per pound—and is very free from injurious substances.

Coal. Soft coal is a most useful fuel. It has a thermal value running, say, from 12,000 to 15,000 B. t. u. per pound. It often contains phosphorus and sulphur in such amounts as to be injurious to work exposed to the bare fire—especially if the work is of steel. Certain varieties of soft coal, however, contain only small percentages of sulphur and phosphorus. These special coals are

2000 degrees, Fahrenheit, an indirect-fired furnace becomes unsuitable because of the high temperatures. The direct-fired furnace should have a combustion chamber essentially distinct from the heating chamber. The effect sought is that combustion shall be completed in the combustion chamber, so that the oxygen shall have all been used up before the work is reached in the furnace proper. A great advantage of oil is the perfection of control permitted by its use. Fuel oil is the

ordinary natural gas.

Acetylene. This gas is a hydrocarbon fuel. It has a high thermal value—about 1550 B. t. u. per cubic foot. But a cubic foot costs about one cent, whereas city gas costs only about one-tenth as much. However, acetylene has special uses which make it a desirable smithy fuel. Especially is it used in “welding” operations with a special torch, or blow-pipe. When so used, a pure oxygen must be used along with it, which runs up the expense still



GENERAL VIEW OF THE STUDENTS' FORGES AT WENTWORTH INSTITUTE

the ones that should be used by the smith.

Coke. This fuel is obtained from soft coal by heating the latter to about 1850 degrees Fahrenheit. This heating process results in driving off the volatile matter—about one quarter of the original weight of the coal. Coke will ordinarily have less sulphur, pound to pound, than coal from which it is made. According to J. S. S. Brame, the coal will have ordinarily lost about 30 per cent. of its sulphur in becoming coke.

Oil. Fuel oil has a high thermal content, the number of B. t. u. in 1 pound being around 19,000. It has a heat capacity 50 per cent. greater than bituminous coal from the Pittsburgh district. Its price varies greatly with the location of the consumer. When fuel oil is employed in the heat treatment of steel in generating temperatures as high or higher than

heavy oil left after crude petroleum has had such light oils as coal oil and gasoline removed from it. The usual manner of using fuel oil is to discharge it from a nozzle as a spray. Compressed air or steam is used to create this spray. Blacksmiths will doubtless use it more and more as they become familiar with its possibilities and as the scope of their own activities widens.

Natural gas. This gas is cheap in certain districts. It is also an effective fuel. In 1 cubic foot of typical natural gas there are from 800 to 1000 B. t. u. It is composed of hydro-carbons. In fact, as a rule, natural gas consists largely of a single hydro-carbon known as methane.

City gas. The thermal value of the coal gas usually manufactured for city use is only about 550 to 650 B. t. u. per cubic foot. Accordingly, it has much less heating value than

further for the reason that such oxygen is expensive and not, like the atmosphere, to be obtained for nothing. There are many applications, however, where the gas expense becomes unimportant.

Having said as much as I have about fuels, I may add a word as to **Oxygen.** This gas is necessary to combustion. It is usually, but not altogether, obtained from the air. The atmosphere may, in fact, be regarded as a kind of very impure oxygen, the impurities having little or no injurious characteristics from a smith's point of view. Oxygen is found in coal and is to be regarded in such case as an unburnable substance like the ash content of coal. The smith cannot add oxygen of the air to oxygen of the coal and get heat. There is, however, a practical use of oxygen in connection with the cutting of steel. If an oxy-acetylene



or oxy-hydrogen jet be slowly passed along with a high pressure oxygen jet following closely, steel may readily be cut. What seems to take place is this: The metal is highly heated by the leading jet. The oxygen strikes the hot steel, whereupon the iron of the steel—and perhaps the carbon, too—is *burnt*. Combustion takes place here just as truly as in a furnace. The iron is converted into an oxide. It is by burning its way that the oxygen jet cuts through. This is perhaps the quickest and most effective method available to the smith for the cutting of thick and thin steel. It is a method confined almost, if not quite, exclusively to steel.

Progress of Forging Instruction at Wentworth Institute

ARTHUR L. WILLISTON, Principal.

A new, complete course in forging, hardening and tempering is being given for the first time this year by Wentworth Institute, an endowed school for boys and young men, located in Boston, Massachusetts. The introduction of this new forging course is but another step in the general progressive program which this school is pioneering in the six New England states. Many new ideas are being developed in various other departments. In fact, it may be said that Wentworth Institute, though this fall entering upon only the fifth year of its existence, has made rapid strides in developing a new sort of industrial education in New England. The fact that each year the school has been filled to its capacity with pupils, notwithstanding that new additions have been made to its plant, leads one to believe that the school is doing the right sort of thing for the young men in New England.

Instruction in forge work has been given each year at Wentworth in conjunction with its machine shop courses. It became evident, however, that many young men were eager for special training to fit them for good-paying positions in blacksmith shops. As a result the new one-year course was arranged, in which forging and related trades are emphasized; and thirty young men from different sections of the New England states are now receiving instruction designed to assist them in becoming first-class workmen.

Both hand and machine forging is taught, the practice including wrought iron and steel work. A

hardening furnace is to be installed later so that the various phases of modern hardening processes may readily be demonstrated. Individual instruction is given, the pupils advancing just as fast as their capability is revealed. The men are taught on the theory that it takes something else beside brawn and might to make a good blacksmith;

forging; hardening and tempering; filing, bench work and simple machine construction. The technical side of the instruction includes blue print reading, machine sketching and drafting, with applied science, practical mechanics, heat treatment and physical properties of materials, and the like. Practical mathematics and shop computations are included.



THESE THREE WENTWORTH BOYS ARE SPLITTING THE FOOT OF AN ANVIL

that to attain proficiency in this important trade the blacksmith must use intelligence and skill. No work is accepted by the instructors unless it is as perfect as it is possible to make it. All the tools needed in the other departments of the school, as well as repair work about the premises and commercial orders, are turned out by the pupils, giving a splendid opportunity for originality. Many fine pieces of grill work also are turned out.

The teaching includes general forging of all kinds, bending, upsetting, drawing and welding; ornamental work in iron; steel and tool

Twenty hours each week is devoted to the shop practice.

Equipment of the forging department includes 17 Buffalo down-draft forges, operated by a Sturtevant blower and exhaust fan; a 150-pound Chambersburg power hammer; a Cave acetylene welding machine; a set of shears and punch combined; a 24-inch drill press, made by Wentworth students from Gavin castings; and an emery wheel stand cast in the Wentworth foundry and finished in the school shops.

The course is given day times and no entrance examination is required. It is necessary, however, for the



prospective pupil to satisfy the principal that he is fitted by practical experience and natural ability, or previous school training, to make a success in the work of the course. The tuition charged in no way represents the value of the instruction. The endowment of the Institute permits a fee as low as \$6 per term in all the day courses, there being

even to the creditors of the landlord.

I have always contended that the average lease of real estate was the most ironclad and one-sided legal contract in the world. It gives the tenant possession of the premises and the privilege of paying rent for it, and almost every question that can arise under the lease it decides

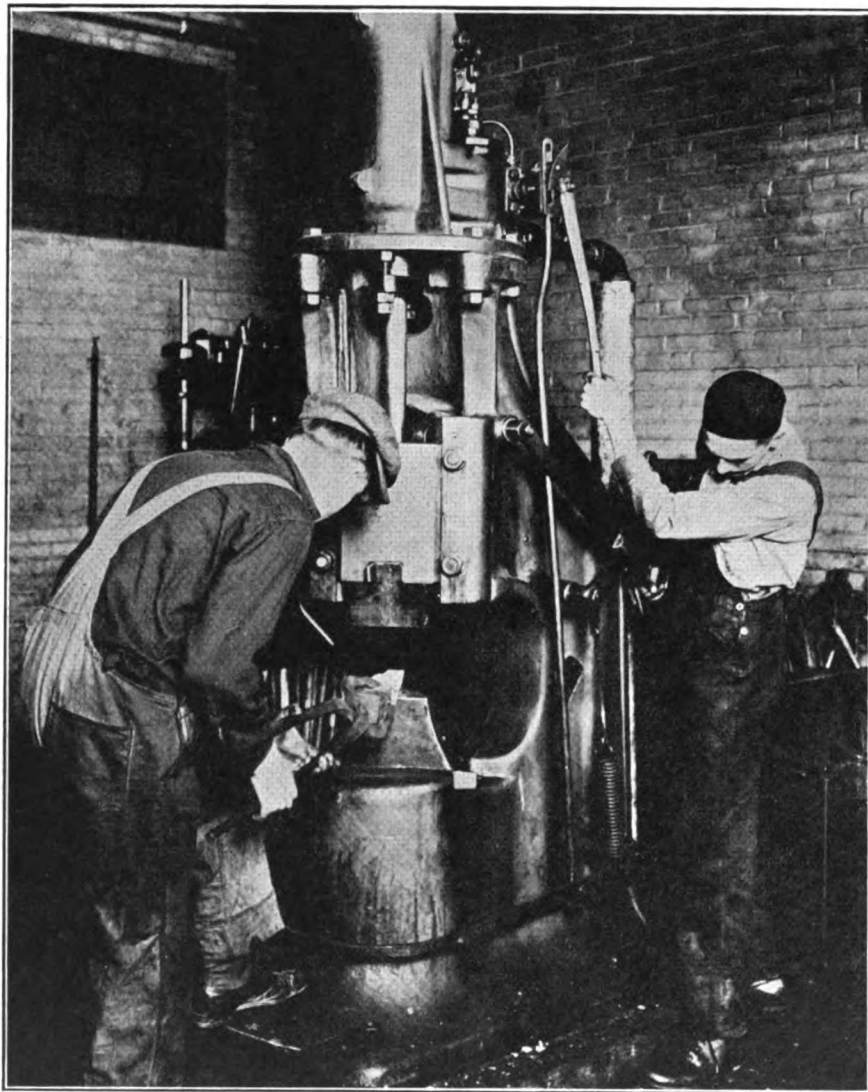
balance of the then term shall at once become due and payable as if by the terms of this lease it were all payable in advance, and shall be first paid out of proceeds of such assignment or sale, any law, usage or custom to the contrary notwithstanding.

This clause is usually used only in business leases, where a building is leased for a store or office or shop. The above clause is of course most unfair, because if any of the above disasters occur the tenancy would come to an end and the tenant would vacate. Therefore this clause compels the tenant to pay for something which he will never get. Nevertheless the clause is perfectly binding and will be everywhere enforced. Many courts have passed on this identical provision, and have always upheld it on the ground that it was first not against public policy, and second because as the landlord could have made the entire rent payable in advance, at the beginning of the lease, he has an equal right to make the entire balance instantly payable upon the happening of some contingency, such as the financial difficulties of the tenant.

There is in all States some law prescribing a limit to the amount of rent a landlord can collect as a preferred claim in case of bankruptcy and similar contingencies. Usually this is one year's rent; in other words no landlord can claim more than one year's rent—that is, he cannot claim more as preferred claim, though he can come in with the rest of the creditors.

Now let me show how this clause works out. It is chiefly important to the creditors of a merchant or business man who is sold out by the sheriff or makes an assignment for his creditors' benefit. In a case which occurred under my own observation, the tenant was a retail dealer who had gotten rather deeply in debt. One of his creditors held a judgment note which he entered up, and issued execution upon. There was enough on the premises, apparently, to pay his claim in full, none of the creditors were moving to put the tenant into bankruptcy, and it looked as if the creditor was going to be able to collect pretty nearly all his claim.

As the case proceeded, it developed that the tenant held his store premises under a lease which contained the above clause, giving the landlord the right to collect the entire balance of the rent if the tenant got into business difficulties and had to be sold out. The tenant owed only two months' rent, but his lease



AT WORK AT THE CHAMBERSBURGH POWER-HAMMER, WENTWORTH INSTITUTE

two terms in a school year. A charge of \$3 additional is made to cover laboratory costs.

On Leasing and Protecting One's Self in the Lease

I have just concluded a case growing out of a lease which gave me a suggestion for one of these articles. The discussion should be useful to everybody—to everybody who owns real estate which he rents to a tenant, to the tenant himself, to the creditors of the tenant, and

in advance in the landlord's favor. The tenant of course signs, because he has no alternative—the landlord would often refuse to rent to him if he did not. Then too he seldom reads his lease, and for that matter neither does the average landlord.

In all the States of the Union today you can buy form leases at stationery and legal book stores containing this clause:

10th.—If lessee shall make an assignment for the benefit of creditors, or be declared a bankrupt, or if the goods upon said premises should be sold under execution against him, then the rent for the



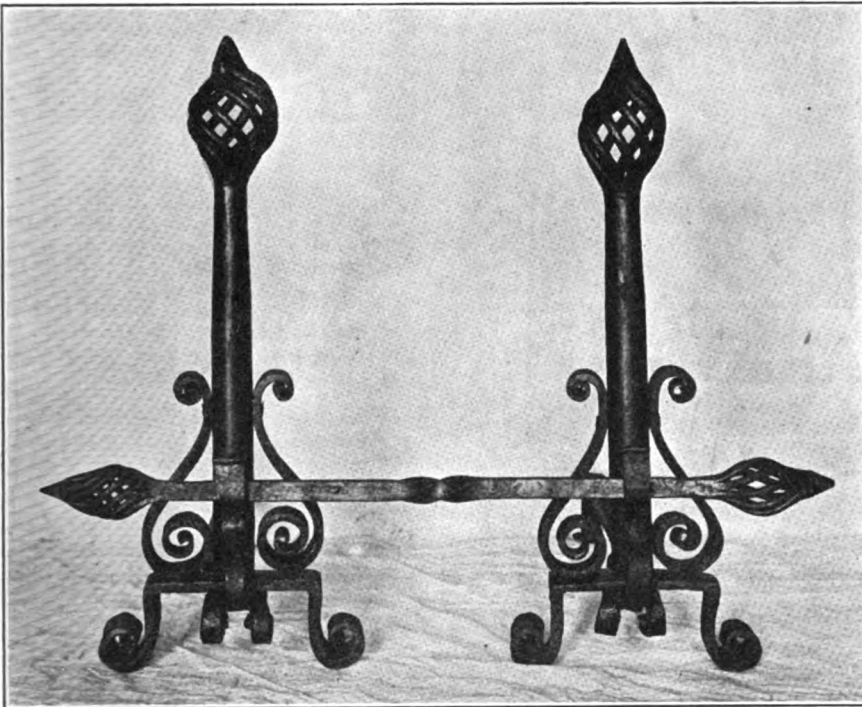
had five months to run. It was of course right that he should be allowed to collect the two months already had, but in addition to that the law allowed him to collect five months more, though the tenant is out of

his assets over to his creditors in some other way.

My thought is that a lease like this should be considered a factor in the granting of credits. A jobber will often grant credit to a retailer

panded as they would have done in the absence of automobile competition.

However, neither the carriage nor the harness makers have any "kicks" coming, and wherever you go you will find the carriage and harness people listed as among the classes who do not complain. Indeed, in many instances harness manufacturers have turned their attention to some specialty from which they have derived more prosperity than was ever thought attainable in regular lines, while it is well known that hundreds of carriage and wagon builders have found the building of motor car bodies a profitable side line.



THESE ANDIRONS WERE MADE BY FORGING STUDENTS AT WENTWORTH.
THE IRONS ARE NOW IN THE NEW HOME OF THE BOSTON CITY CLUB.

business and the building is vacant.

The result was that this rent claim ate up practically all the proceeds of the sale, and the other creditors got little or nothing.

This is why I say that the subject is particularly interesting to the creditors of a tenant bound by a lease like this. Naturally it is also interesting to the landlord who has bound his tenant by such a lease. The tenant himself is not in a position to care so much, for if he is bankrupt it makes little difference to him how his estate is distributed among his creditors.

So far as I can tell, this clause would be enforced in every State of the Union, up to the limit prescribed by the given State as to the amount of rent that a landlord can claim if anything happens to his tenant.

The situation is changed if a tenant actually goes into bankruptcy. Under the National Bankruptcy act, an adjudication in bankruptcy ends a lease, and the landlord can therefore only collect the rent that has already accrued. In many cases, however, a business man who is unable to pay his debts will not go through bankruptcy, but will turn

whose stock and fixtures are apparently good security, forgetting that almost all the proceeds of a forced sale of the stock and fixtures might be absorbed by a rent claim under a lease with the above clause in it. It might easily be that the landlord could collect *eleven months'* rent, or even twelve, though every cent of it was future and not past. (Copyright, by Elton J. Buckley.)

No "Kick" Coming

That the automobile has cut a wide swath in the carriage and harness making business every one will admit, yet it cannot be said that the sale of popular priced carriages and harness has decreased to any great extent, as there are now as many or perhaps more horses in the United States as there were ten years ago. But it is certain that had the automobile not been invented there would have to be double the number of horses and vehicles in use today. Consequently these businesses would have doubled themselves.

The fact is, the harness business, like the carriage industry, is not less extensive than it was ten years ago. These industries simply have not ex-

Fire Prevention in the Smith Shop

There are perhaps few businesses where, to all appearances, fire prevention is given so little thought as in the average smith shop. Yet most business establishments run a considerable smaller risk from fire than the smith shop.

Probably the greatest cause of fire in the smith shop is the defective flue or chimney. Then perhaps, comes neglected rubbish, waste paper and rags, with careless handling of oils and defective electric wiring and gas fitting following closely.

To guard against the defective flue, the remedy is obvious. In any case an occasional cleaning of the forge chimney can do no harm. An easy way is to suspend a heavy chain from the top end of the chimney and work it up and down.



Benton's Recipe 'Book

A soldering solution that is inexpensive and very easily made and is said to be equally well suited for bronze, tin, brass and copper, is made as follows: Dissolve as much zinc chloride as possible in water. This is known as a saturated solution of zinc chloride. Now add to the zinc chloride solution one-tenth part by weight of sal ammoniac (ammonium chloride). The ingredients are thoroughly mixed be-



fore using. This solution may also be used in the soldering of galvanized iron, as the union of the galvanized surfaces is said to be perfect when this flux is used.

A soldering paste is sometimes preferable to a liquid, and in such cases a paste composed of $\frac{1}{4}$ part sal ammoniac, $\frac{1}{4}$ part alcohol and $\frac{1}{2}$ part vaseline will be found excellent. The paste must, of course, be thoroughly mixed before it is used.

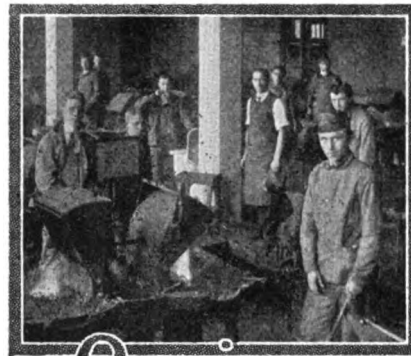
An oil stone will sometimes cut too coarse for certain tools that it is desired to sharpen on it. Knives and wood-working tools sometimes require sharpening when no finer tool is available. When confronted with such a condition, use soap and water on the stone. This will enable you to secure a smoother and finer edge on the finer tools.

A cement for attaching brass strips to wood is asked for by A. H. B. And in looking through The Book we find the following suggestion: Take of glue as used in the carriage wood-shop and for every pound of dry glue take one fluid ounce of glycerine and one ounce of slacked lime. Boil the glue in the usual manner, add the glycerine and lime and stir well until thoroughly mixed. Now for each pound of glue used add two teaspoonsful of boiled linseed oil and again stir thoroughly while boiling. If the resulting mixture is too thick, thin with linseed oil. The mixture is now ready for use, but before applying it to the brass dip the metal strips into a nitric acid solution made of ten parts water to one part acid. This treatment tends to roughen the surface of the brass and thus causes it to hold better. Now warm the brass and also the wood and after applying the glue in the usual way clamp the parts tightly with wood workers' clamps and allow to set. This cement will hold the parts firmly.

The true mechanic or the Botch soon make themselves known when they attempt to use the vise. And especially is this true on fine work and on articles having a high finish. The good mechanic will have on his vise bench several sets of false vise jaws made of various materials. Jaws of lead, copper, wood, and even paper are not uncommon, the good mechanic's bench. And when a highly polished piece is to be held in the vise he is careful to use the jaws best suited to hold it without injury. The brother mechanic of opposite tendencies is not troubled with these contrivances, however, and when he delivers a piece of fine work that has been scratched and chewed in the vise he has to make excuses, when his lack of real mechanical ability is really to blame.

Belt dressings by the score are on the market, but some readers evidently prefer to make their own. One that is recom-

and after melting one-fourth pound of beeswax slowly over a gentle fire, pour the melted wax slowly into the oil. Stir thoroughly until well mixed when it is ready to apply to the belt.



Queries— Answers— Notes

Cutting shares without waste.—The diagram herewith shows how to cut plow-shares without waste. This stunt I thought was familiar to all smith, until I read the query of one reader who wanted this information.

I. N. B., Washington.

A Lister lay holder.—The accompanying engraving shows a Lister lay holder that I made and as it works perfectly, I am passing on the suggestion for the benefit of other smiths who may be interested. This device should interest the practical plow worker. The device is adjustable to all lays. In the engraving pieces A and B are from $\frac{3}{4}$ by $1\frac{1}{2}$ -inch mild steel. The piece C is made of $\frac{3}{4}$ -inch round steel and threaded as shown. The pieces D and E are made from same bar as A and B. To use this device, bolt it onto the lay as shown and spread the arms A and B by turning the threaded rod C. A detail of rod C and the pieces D and E is shown at X.

GEORGE M. ROBBEN, Kansas.

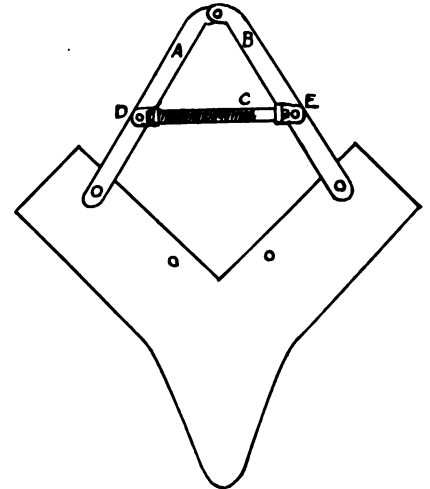
Shoes springing and toe clips.—I see in the June number, one brother speaks lightly of Brother R. F. Walker's statement that a shoe is narrower after it is nailed on, but if the brother will take a pair of calipers and lock them down, he will find Brother Walker's statement is correct. That is, if the nails plug tight in the holes, it makes no difference what weight shoe you use.

As to the little toe clip, I think that is only to a man's notion. One brother says in the large cities you can't hold a shoe without them. Well, here we have very hard macadam roads, mostly oil-

accordingly. I do not have any trouble in holding the shoes without a clip, although I sometimes use them. Really, I think it is more of a fad than anything else.

A. STARK, Missouri.

For tempering mill picks.—I heat the picks to a cherry red or enough so that they will work easily and draw them to shape. I edge them up on the start so that they will not be too wide when finished and after I have drawn both ends then I heat just so that they will show red and water. Hammer till the water will stand on the point. This I do



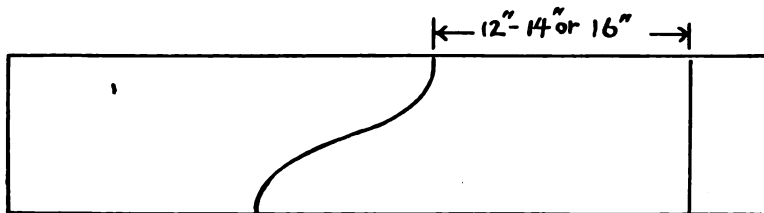
A LISTER LAY HOLDER

three times using a light hammer and light blows. I hammer about two-inches from the end this way. Now heat to dark cherry red and cool in the following solution: Sal Ammoniac, 1 oz.; Corrosive Sublimite, $\frac{1}{2}$ oz.; Alum, 1 oz.; Salt Peter, 1 oz.; Magnesia, $\frac{1}{2}$ oz.; Borax, 1 oz.; Oil of Vitriol, 1 oz.; salt, 1 lb.; water, 3 gals.; Draw no temper on picks. I use this for mould boards and corn plow shovels where they are soft center steel and they can be so hard they will cut glass and not break. I use it for edge tools also, but draw the temper to blue after cooling in this solution. Do not be afraid to try this as I have used it for about 36 years.

R. R. TICHENOR, Minnesota.

NOTE.—Extreme caution must be exercised in the use and handling of the ingredients of the above mentioned solution, as two are poisons. Keep the solution away from children and animals and use every care in handling and using it.

Was glue used?—In your Queries and Answers, there is an item sent to you by Joe J. Pettigrew and was written by Annie Pettigrew of North Carolina. Six of the family are blacksmiths, which is very rare thing. She also states that her father, Mr. B. F. Pettigrew, can play a tune while fashioning a shoe and put on four shoes in seven minutes. I do not doubt Miss Pettigrew's word of playing a tune while fashioning a shoe, but when it comes to putting on four shoes in seven minutes which she boasted about, several well-known shop owners and myself, in Trenton, will give Mr. Pettigrew \$250.00 for the name or brand of glue he uses. I have worked in most of the largest



CUTTING SHARES WITHOUT WASTE

mended highly by a man of considerable experience is given here for F. J. H. in particular and every other reader in general. Take one quart of neats foot oil

coated, and if a man has a pair of one thousand pound horses, he thinks nothing of loading with from 60 to 75 hundred pounds. The large teams are loaded



cities in the country where horseshoeing is mostly piece work. I have seen some good feats turning and driving in shoes, but Mr. Pettigrew's dream has them all beaten forty ways.

FRANK W. OTIS, New Jersey.

Another blacksmith family.—In reading over "Our Journal", I noticed there was a family by the name of Pettigrew who were all smiths, five sons and the father. Well, my father has four brothers who were all smiths, also himself and his father. They all served four years in learning the trade and all learned it in New York. My father is next to the youngest boy, and he is 61 years old and still likes the trade; I am also a blacksmith. Father and I are partners. My father's name is Charles G. Crofoot, and mine is the same. The other four boys' names were: Marion, Wesley, George and Frank. I don't know how many sons they have that are smiths, but I know there are some. My grandfather on my mother's side, also was a blacksmith and a Methodist minister. His name was Rev. Gidern Powledge. I am very proud, indeed, to know that my grandparents and four uncles and my father were all blacksmiths. I am the only son my father has. Father and I run a general blacksmith shop. We have our shop equipped with machinery; a $4\frac{1}{2}$ H. P. winner gasoline engine; Kerrihard power hammer; double emery grinder; spoke tenoning machine; power drill; 16-inch jointer saw and rounder combined; also power blower that blows both fires, as we have two brick forges. Am going to make a fan to put over each anvil so there will be a nice breeze when we have our engine running. Our shop is 24 by 50 feet. We have all necessary anvil tools and wood work tools. We also work on autos, and get lots of helpful information out of your auto department. Our aim is to do good work at reasonable prices and keep a clean, nice shop.

C. G. CROFOOT & SON, Texas.



The Automobile Repairman

Anti-skid chains should be applied so the hooks are turned away from the tire so as not to chafe or cut the tire casing.

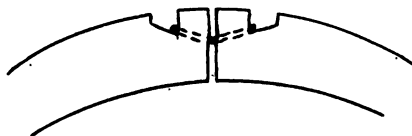
A Fan Drive Repair

L. R. SWARTZ.

A Ford car that had been equipped with Westinghouse Self Starter

and generator was brought in one thought that a pin had sheared off, night for repairs. The owner which, he said, secured the driving pinion to the crankshaft.

When we got the housing off, we found that the Morse chain was



A FAN DRIVE REPAIR

broken and jammed between the spur and grease pan under the crankshaft. The hand crank was still attached to the car, but there was no means of driving the ventilating fan because the original fan belt pulley had been removed to make room for the driving spur on the crankshaft, and the fan was driven from a pulley on the armature shaft of the generator.

The repair was made by sewing together the ends of a leather strap so as to form a collar which was chamfered a little on the inside of collar at the end next the engine and forced tightly over the driving spur so as to give a smooth bearing for a new fan belt which was put on.

The spur with its leather face was considerably larger than the original fan belt pulley, but that was no disadvantage, because they had altered the pitch of the vanes of the fan so it would run clear of the pulley on armature shaft of starter and generator and also that the increased speed of the fan gave about the same air current as before the starter and generator was installed.

In making the collar the ends of the strap were cut square so as to butt together. Then a crease was run $\frac{1}{4}$ -inch away from the ends across the strap and about $\frac{1}{12}$ -inch deep so that the stitches would not be worn off by the fan belt and also to afford a smooth surface for belt to run on.

The Automobile Repair Shop

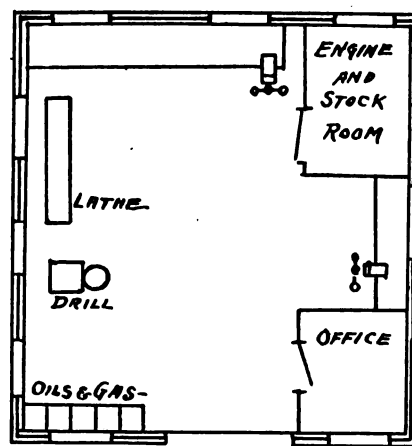
By "AUTO SMITH".

Introduction

It hardly seems necessary to offer any arguments as to why the blacksmith, horse-shoer and vehicle-builder should go into the business of repairing automobiles. It may be well, however, to point out just a few of the reasons why every member of the smithing craft should seriously consider the opportunities

that are presented in the automobile repair field. Blacksmiths generally find that the automobile has seriously affected their business. Not only has the motor vehicle cut down the shoeing trade, particularly in driving horses, but the smiths who are located in the towns, find that the butchers', grocers' and general stores' delivery system is now cared for by the garage and automobile repairman instead of, as formerly, by a horse-shoer and wagon-repairer. Furthermore, it would seem as though the repair of any vehicle used on land would be a legitimate job for the horse-shoer and wagon-repairman. The blacksmith has been building, repairing and caring for horses and horse-drawn vehicles for so many years that surely it must be agreed that the automobile is rightly his.

To take up automobile work, the blacksmith should not make the mistake of attempting to sandwich it in between horse-shoeing, general blacksmith and vehicle work. This is not because automobile work does not belong there, but simply because that part of the general public who do not yet own automobiles are not willing nor ready to let their work take its turn with automobile repair work. For example, suppose the blacksmith is at work fitting a tire or doing any of the many repair jobs that are likely to be done upon the wagon or buggy. A customer comes in with a broken



A SMALL AUTOMOBILE REPAIR SHOP

wheel or shaft and when told that he will need to await his turn, if he is a reasonable man he will not object. However, suppose the blacksmith is at work repairing an automobile, nine chances out of ten, the customer will kick and kick hard when told that he will need to wait until the automobile work is finish-



ed. This seems unreasonable, but you readers, who have attempted an occasional automobile job, know that this is so. The writer, therefore, wants to emphasize the need of keeping the automobile work separated from the regular horse-drawn vehicle work as much as possible.

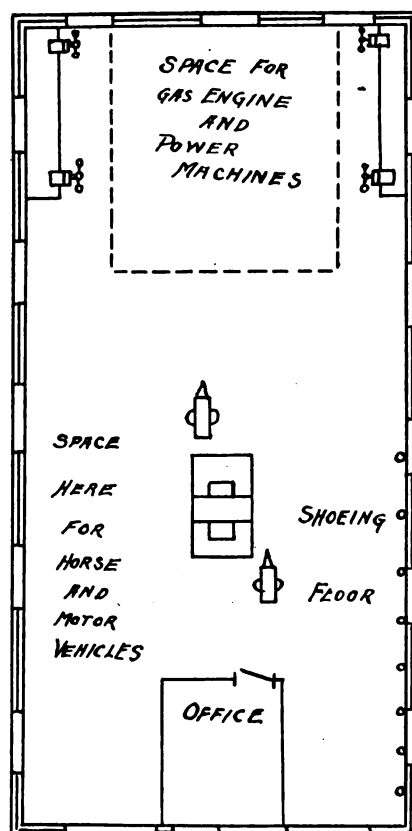
Another point that may be well to bring out in introducing this series of articles is the very evident confusion in the mind of the blacksmith and also the general public regarding the garage and automobile repair shop. A garage is a place for storing automobiles and for cleaning, washing and giving them minor care. The automobile repair shop, on the other hand, is just exactly what its name implies. Some garages are also automobile repair shops, but it is not at all necessary for the automobile repair shop to be a garage anymore than it is necessary for the horse-shoer's shop to be a livery stable. However, the storing of cars can be made a profitable part of the business and if one has the space, he will find that the garage end of the business acts as a feeder for the more profitable repair end.

The Shop

Right now is the best time of the year to get ready for the automobile season. About February or the first part of March, automobile owners will be getting their cars into shape for operating; new cars will be purchased and you want to be ready to take care of this business when the season opens. A start now will enable you to have your shop and equipment in good shape in plenty of time.

Now, perhaps the first thing for the prospective automobile repair-smith to decide, is whether or not his present shop space is sufficient to take care of automobile work. If he can possibly arrange his shop so that some space, no matter how limited, so long as it will accommodate one or two cars, can be turned over for this work after the repair smith has been in the business for a short time, he will soon know if more space is needed. While many blacksmiths have erected special buildings for the accommodation of their automobile repair business, the average blacksmith will perhaps prefer to proceed cautiously until he is assured as to just what space he will require for his automobile trade. Individual conditions will, of course, tell the reader more than anything else, just what he will need in the way of room.

The accompanying illustrations show two shop lay-outs for the blacksmith who feels that he will need considerable space for his automobile repairing. In one of these lay-outs, it will be noted that these shop have been arranged to take care of horseshoeing, wagon and carriage repairing and general blacksmithing as well as automobile repairing. And if the shop-owner



THE SMITH SHOP EQUIPPED FOR AUTOMOBILE WORK

has the help and men, there is no reason why all of this work cannot be taken care of in one shop.

The Equipment

So much for the shop and space devoted to the work. Now to equip the shop so that work can be done quickly, efficiently and in a workmanlike manner, a great many of the tools needed in automobile repair work will, of course, be found in the average smith shop equipment, but in order to make the matter of equipment entirely clear, we will endeavor to detail a complete list of the tools and machines required, leaving it to the individual shop-owner to take from his regular blacksmith shop equipment such tools as he can spare. Do not make the mistake, however, of attempting to use certain tool or set of tools both in the general blacksmith work

and in the automobile shop. Particularly is this practice a folly in the case of the more frequently used tools. Naturally, of course, it would be foolish to purchase a new grinder for the automobile repair shop, if you already have an emery stand in your blacksmith shop.

First, then, will be a lathe. The 14-inch size with a 6-foot bed will perhaps be found best suited to the requirements of automobile work. Next will come an emery grinder with a double head for holding two good 4 or 6-inch wheels. Then you will need a drill press and perhaps an air-compressor.

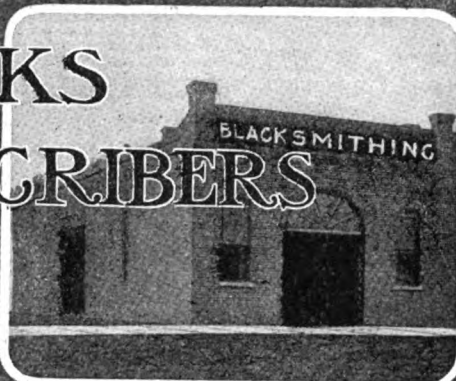
Of the smaller tools you will want to equip your shop with a chain hoist with which to lift engines out of car frames, also for removing the bodies from cars. Then you will need a blow torch; a good machinist's vise; 2 or 3 sizes of pipe wrenches; the same of monkey wrenches; also 1 or 2 S-wrenches with adjustable jaws; a hack saw frame with blades; a one-pound machinist's hammer; 2 or 3 combination pliers; a soldering outfit; several screw drivers of various sizes; a pair of tinner's shears; a set of taps and dies with tap wrench and die stocks of such a size as is suited for automobile work. (Tap and die manufacturers put up special sets that are particularly suited for automobile repair work). There will also be needed several cold chisels and center punches; a breast or hand drill; a set of files of various cuts and sizes; a combination gauge and screw plate for measuring the sizes of wire, drills and screws; a set of socket wrenches; a vulcanizing outfit; a valve grinding outfit; a set of calipers, consisting of one for measuring inside and another for measuring outside surfaces; a wheel puller; a stand for holding motors after they are removed from the car; a set of carbon scrapers; an oil gun; a grease gun, and at least one good automobile lifting jack. This list of tools can, of course, be added to as needs and requirements dictate, also the average smith shop-owner will find that he already had a great deal of this equipment right in his shop at present, and the list that he will find he needs to purchase will by no means, be as long as the list of tools enumerated above.

(To be continued.)

NOTE.—The next article in this series will take up the subject of accounting in the automobile repair shop. This is a most important matter, as it is very easy for the automobile repairer to spend a great deal of time on work that is unprofitable. The next installment will explain in detail, the money side of the automobile repair business.



TIMELY TALKS WITH OUR SUBSCRIBERS



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The Winter Evenings

The winter evenings present an opportunity that should be grasped by every ambitious member of the craft. At this season one seems to have more time than ordinarily, for reading and study. It is an opportunity for the craftsman to brush up on his knowledge in certain lines of keep the sides of the shop from decaying his work. Some men will read upon machine work and machinist's operations, others will study upon ornamental work and still others will get their brain working on the automobile repair business; all of them working, reading and studying with the idea of enlarging their activities, improving their knowledge and increasing their earnings.

If you are ambitious, if you are planning to take advantage of the longer evenings, get in touch with our Book Department and let us help you get the books you want and need. Tell us what you have in mind and then let us suggest the books you need.

You Must Use It

The bucket of paint in the cellar won't preserve the wood of the structure you must apply the paint. Buying and paying for the bucket of paint is not enough—you must apply it.

Ordering and paying for this paper won't in itself, make you a better smithing craftsman. You must apply the material contained in it. You must read the articles, strictly the methods, and apply the suggestions and information right to your own work and in your own shop.

Simply being a subscriber to "Our Journal" will not help you, anymore than the unopened bucket of paint on the shelf will help the unpainted side of your shop. Here is food for thought.

Subscription Agents

When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon him showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

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Timely Talks with Our Subscribers. Ten Business Resolutions

These resolutions have been published before, but they are such good suggestions that they will bear repeating at this time. There is not one of the ten that every loyal member of the craft cannot heartily and enthusiastically support. Read them carefully, Mr. Reader, and then try to conscientiously live up to everyone of them.

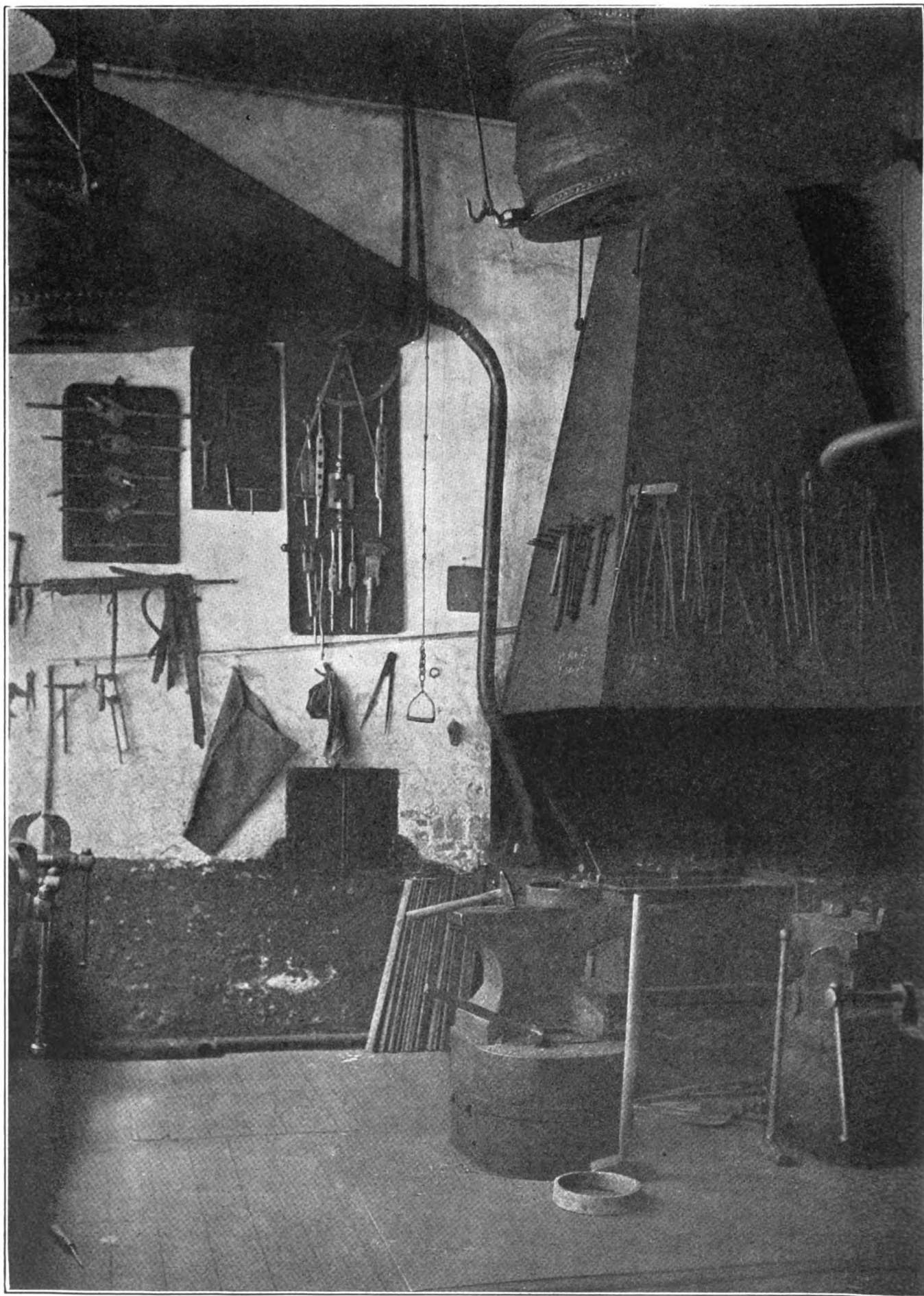
Resolved:

- 1.—I will not cut prices.
- 2.—I will find out what my real costs really are—I will not guess.
- 3.—I will be fair and square with my creditor, my customer, my competitor, my employee, and myself.
- 4.—I will get acquainted with my competitors and really know them. I will try to form an organization for our betterment and for mutual good.
- 5.—I will systematize my business—I will increase my business—I will seek out the leaks and thus cut expenses—I will increase my yearly profits.
- 6.—I will neglect no opportunity to improve my knowledge of business and conditions; I will neglect no opportunity to uplift the trade; I will support all good movements for the betterment of trade and the business.
- 7.—I will support the local association by being a good member in all respects; I will do all I can to strengthen it and to further its purposes.
- 8.—I will read and study my trade papers: I will not allow my subscription to expire; I will write to the Editor, frequently, to state my views on the topics discussed and on the general worth of the paper as published; I will criticize when I feel criticism is deserved, and will praise when praise is merited; as I realize that it is MY PAPER and that what I get out of it depends upon the attention I give it.
- 9.—I will advertise my business, carefully; for I cannot expect people to know what I have to offer them unless I tell them about it in one way or another.
- 10.—I will work hard when there is work to do—play wisely when the play period arrives—read carefully of trade literature—be fair to my family, and be fair, square and honest in all things.

Twenty Years Ahead

Do you know, Mr. Reader, that one of "Our Journal" subscribers has paid his subscription in advance for twenty years? Do you know that others of "Our Folks" have paid in advance for all the way from two to eighteen years? And then do you realize what those figures mean?

This must be some indication of what readers think of "Our Journal". This must show, at least, to some measure, how strongly and practically THE AMERICAN BLACKSMITH appeals to "Our Folks"—how well it measures up to the need, the want and the requirements of the modern smithing craftsmen.

**THE FORGE**



The Small Points About the Shoe

The Fullering, the Nail Holes, the Clip and the Calks

B. L. LEHMAN

THE importance of the smaller points of the shoe, namely the fullering, nail holes, clips and calks, is generally overlooked by the average shoer. Of course, in these days of machine-made shoes and the gradual disappearance of the old smith who could turn a perfect shoe, there is not much call for knowledge and skill in the making of a perfect fullered shoe with nail holes hand punched, and every part hand turned. It is, however, no disadvantage to know how these small points about the shoe should be made in order to be correct. Judging from observations

estimation, be about as is shown in the engraving, Fig. 1, A. The depth should be about two-thirds of the thickness of the shoe and be well balanced, i. e., each side wall of the crease of uniform slant. At B, Fig. 1, is shown some of the fullernig that you would probably come across in the shoes turned by the six smiths above.

The nail hole is, perhaps, second in importance to no other point about the shoe. Its position in the shoe depends upon the foot into which the nail is to be driven. Of course, here again is the shoer dependent upon what the manufacturer gives him.

The distance of the nail holes from the outer edge of the shoe should, of course, depend upon the thickness of the hoof wall. Therefore, we find the nail-holes nearer the outer edge in the smaller shoes than in the larger sizes, and also punched coarser at the toe than toward the heel.

The clips on the shoe caused considerable discussion in these columns as the writer remembers, some months ago. There seemed to be some question regarding the exact shape, size and slant that should be given in the toe clip. In Fig. 1, at C, are shown several common forms of toe clips. Here are shown the round, pointed clip with concave edges, the sharp pointed, acute angled clip, and third, the heavy, cumbersome clip that some shoers seem to think necessary.

At D, in the same figure, is shown a clip that may appear odd to the average reader but which, in my estimation, is properly proportioned and well formed. This clip will efficiently perform every office expected of the clip and yet it is not dangerously long nor large and heavy. The clip shown is on a flat, uncalked shoe and is made of a height about equal to the thickness of the shoe. On a calked shoe it may be desired to make the clip a bit higher and, perhaps, a trifle heavier; however, I am a believer in getting clips lighter and smaller rather than

larger and heavier. If the clip is merely to assist in keeping the shoe from shifting on the foot, a small

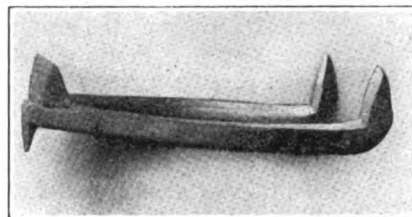


FIG. 3.—A WINTER SHOE WITH A LARGE TOE CLIP

clip, properly made, will do the work as efficiently as a great, big, clumsy clip. Most clips are too large. Take for example the shoe shown in Fig. 3. Here, it is true, we have a winter calked shoe, but I think it can be held properly with a shorter clip. And, then, too, I think the calks on this shoe are somewhat longer than they really need be.

And speaking of calks—what wonderful creations you will find by looking over the product of the smiths in different sections. But look over the engravings; note Fig. 4. Doesn't that look sensible and good? Not too much iron, well turned and

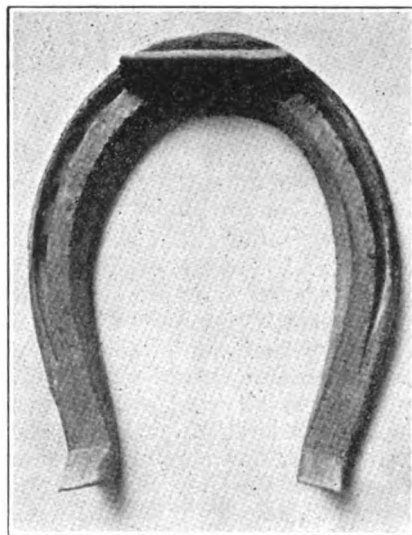


FIG. 2.—NOTE THE FULLERING ON THIS SHOE

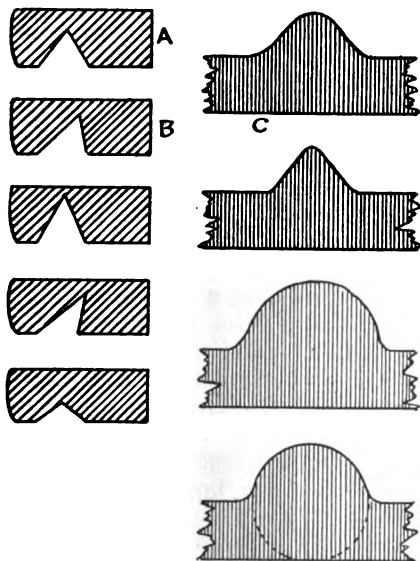


FIG. 1.—THE FULLERING AND CLIPS CAN BE MADE INCORRECTLY

made in other shops and from the work turned out by applicants for jobs, there are, generally speaking, few of the later day smiths and shoers who know when a shoe is correctly constructed with all the small points about the shoe made as they should be made.

Take the fullering of a shoe for example. Were six smiths to turn six shoes and fuller them, you would in all probability find six different styles of fullering. To be correct, the fullering of a shoe should, in my

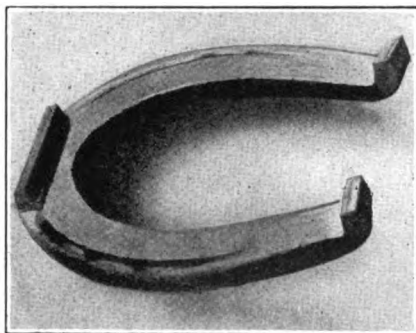


FIG. 4.—A WELL FORMED, WELL CALKED SHOE

all in all, well proportioned. Then look at Fig. 5. Except for special treatment the calks are too high; and then see Fig. 6 with the great, heavy lump at the toe. Fig. 7 shows an example of sharp calking that looks well proportioned—not too high and a well turned shoe.

But, of course, after all, each foot presents a case all its own. Each job of shoeing must be treated individually. The foregoing is, of course, applicable to the shoeing of healthy feet and normal limbs only. When one gets away from the shoeing of the foot and limb in health, then

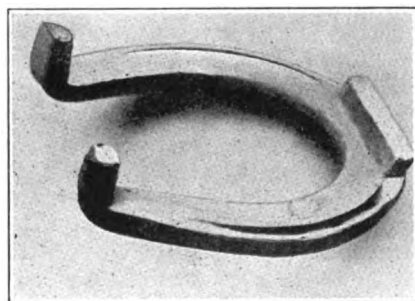


FIG. 5.—AREN'T THESE CALKS TOO HIGH FOR REGULAR SHOEING?

more than ever must the shoeing depend upon his own observations to meet the conditions as presented to him.

More About Shoers and Veterinarians

JOHN A. MUNRO

I was very much annoyed by reading that article of Dr. Jack Seiter in our September number. We get enough skull dropping by the vets in other periodicals without letting them in on Our Own Journal. The article seems all right so long as he keeps to theoretical criticism, but when it gets down to practical explanation the writer shows his lamentable ignorance. When he tells us to carve down the side the wear is on the old shoe, he is mistaking the horse's leg for a straight stick with-

out any joints. The joints being there, it is not necessarily the highest side that reaches the ground first. And, if it does, it is not the side that carries the weight. The low side will carry the weight every time and consequently, this breakover. And if he carves that side lower every time, he will be bald-headed before he gets his horse to wear a level shoe.

I have been at it for the last 34 years, fitting personally up to today, and have handled every class of horse, but have never been among the snow. I've been just enough among trotters and pacers to know that they are shod on a system totally different to other horses owing to the different pace conditions they work under. A man who has been superintending the shoeing of the pick (and consequently the most perfect in gait conformation) of that class of horses, and admits to having only one with bad feet in 200, considers he can teach us on his one specimen.

I hold no brief for the freak shoe, nor do I believe in the calks and heels where they can be avoided, but I have had sufficient experience to know that circumstances alter cases. No sane blacksmith now-a-days carves out the sole, or touches the frog, or bar or rasps above the nail. I have horses who wear out their shoes in a month, who get nothing taken off the circle. All that comes off is from the bottom of the wall. Others who take a year to wear out their shoes, and have them reset about three times, in fact, I have a specimen in the shop which I clipped off a horse (when re-shoeing) with every nail and clinch intact, and the shoe is there the same as the day it went on five months before. This shows a totally downward growth. Others who carry them three or four months show a totally forward growth, pull them under the heels, and develop a long toe which must be taken back, consequently coming off the circle. The trotter generally carries the medium foot between those two extremes, and is really the simplest proposition of the lot.

Balancing the Horse

J. OLSON

In November I noticed in particular an article written by Bro. C. Bravender of Mississippi. He dealt on scientific shoeing, thrush and cutting. In regard to the last two mentioned he may be as near right as any of us, but I beg to differ with him when it comes to defective feet

that need leveling and the shoe reinforced. There was a time when I did as most of the horseshoers do today; pare all the feet alike and fit all shoes alike, but I came to the conclusion some twenty years ago it was not the proper way to shoe a horse as horse's feet are not alike at all. In a good many cases two feet on



FIG. 6.—A TOE CALK OF TOO GREAT SIZE AND WEIGHT FOR REGULAR WEAR

the same horse are not alike, like human faces they all look different. The old shoe tells me better how to shoe a horse than the driver could that drives the animal, or better than I could myself, without seeing the shoe. Shoes speak louder than words. The most worn parts I reinforce; I also level the high side of the foot as much as possible, and reinforce and harden the extra worn part of the shoe. By so doing I have had the very best of success in straightening horse's feet, and in many cases the horse can wear a shoe perfectly level without any reinforcing. The foot that is not

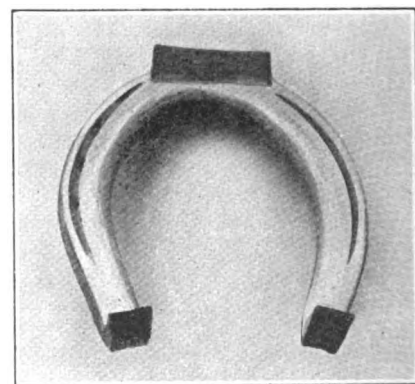


FIG. 7.—A WELL PROPORTIONED SHARP CALKED SHOE

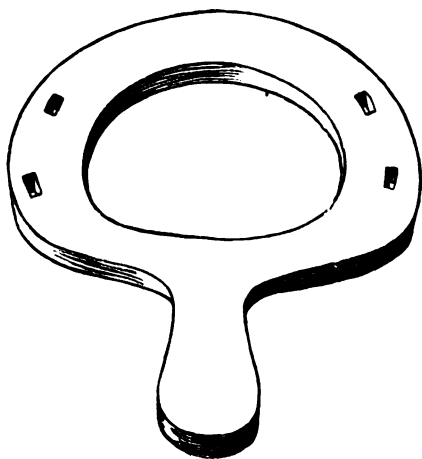


perfect is unnatural and so give nature a chance.

I have had a good many horses come under my observation that wear their toe off on the hind feet to such an extent that the toe is worn off one inch. I would like to have some one tell me the cause and a remedy for the same. My idea is that the cord is strained to such an extent and is the cause of the trouble, but I would like to know a remedy for each. I put on two calks, one on the top and one on the bottom of the shoe, giving the foot a chance to grow out before the shoe is worn in two.

It is not very often I find a teamster or horse owner that does not agree with me on this kind of treatment; although the other day a teamster did not agree with me. He brought a horse in that was ruined when a colt by working too soon and was put in with a six-horse team. Being high strung he tried to pull the whole load and sprained his hind legs, and the animal has been walking on his toes ever since. The teamster asked if I could shoe him his way and I said I would, but not to blame me if the horse did not go right.

The instructions were to cut his toe down as low as possible; the toe was shorter than his heel. Had I



THIS SHOE COVERS THE TOE AND GOES BACK LESS THAN HALF WAY TO THE HEELS. A CROSS BAR AND FROG BAR FINISH IT

had my way I would have cut the heels down, in order to run as little chance as possible for the horse getting off his feet. I made a shoe as long as possible to make up for the shortening of the toe.

Two days later I asked him how the horse went. He said he never went better in his life, but in front he was like the horse I spoke of as needing reinforcing. I pared the

high side down and reinforced the low side.

The teamster said the horse stepped so hard on the lower side of his foot and that I ought to lower it more so he would not make such a

the bar shoe one question. How do you expect a foot to expand when it is clamped in the way any bar shoe holds it? We are told to put on a bar shoe and give frog pressure. How can the foot expand?

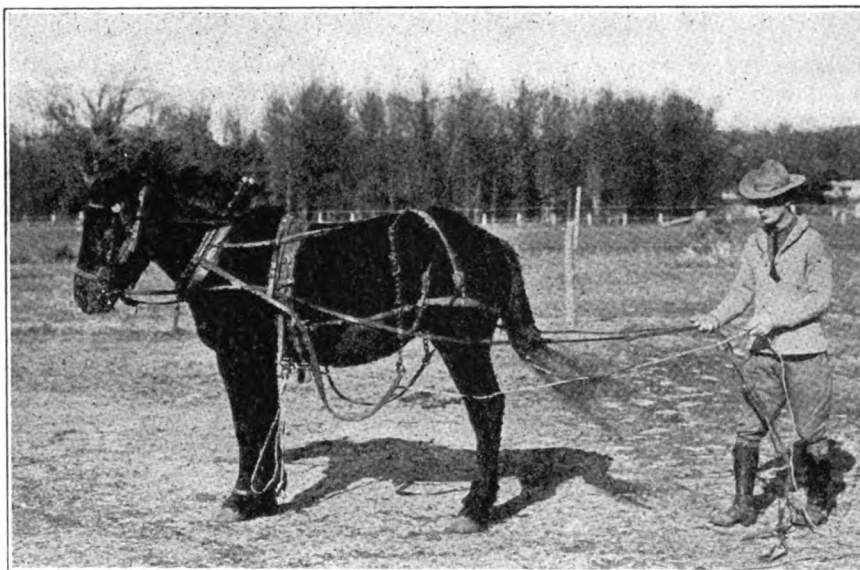


FIG. 7.—IF THE COLT IS ONE THAT YOU THINK WILL KICK PUT ON THE TRIP ROPES

deep impression in the ground; so here is a man who would agree with Mr. Bravender. I tried to explain to him in this way that if two men were carrying a load on a pole equally divided, one man being the taller, which of the two would carry the most load? So it is with the low side of the foot, it carries most of the load and where the pressure is greatest the low side of the foot will not grow one-tenth as much as the high side will; therefore, I say, build up the low side. For instance, I take my shoes to the shoemaker. They are worn or run over and my toes are worn down. If the shoemaker would lower them still more, would I ever go back? I would like to hear from several as to whether my argument is right or wrong.

Good judgment and the best of care must be taken not to overdo the same at any one time. It is true that old horses' limbs are set and cannot be straightened as well as on a colt or young horse, but proper shoeing will strengthen the crooked and weak parts of the leg. I hope I have made clear my subject and will not be misunderstood.

Does the Bar Shoe Allow the Foot to Expand?

PHILO BUNDY

I want to ask some of the users of

Here is my method of treatment for contraction: Use a tip made with a bar extension from it to the end of the foot on top of the frog; a tip with two nails on each side. Let the tip extend back one-third of the way from the toe. Now put it on and drive the nails well up. When this shoe is put on, soak the feet two or three times a day in raw linseed oil. Continue this for three weeks or a month, but don't drive the horse. Keep him in a clean stall and in a short time I will venture to say you will see a marked difference in the heels of the hoof.

You cannot cure a horse of contracted heels and drive him; neither can you better his feet by clamping them in a vise-like shoe, such as a bar shoe. Now let's look at the foot. Let it be contracted as it may, pick up the front foot and put your thumbs at each point of the heel and then pry open and you will see the foot give. Then stop and think. You will see what I am trying to drive at.

Breaking and Training Colts—Part III.

V. G. STAMBOUGH

Driving Single

Put single harness on the colt, using an open bridle. Lead him to the rig and allow him to examine it. A two-wheeled breaking cart with



long shafts is usually used. Let the assistant draw the rig around the colt a few times, or until the colt does not shy at it; then raise the shafts and draw the rig into place. If the colt is one that you think may kick or try to run, put on the trip ropes. (Fig. 7.)

Some horses are confirmed kickers, runaways, or otherwise unsafe to handle with the ordinary appliances. With trip ropes such horses may be handled with safety and cured of many bad habits. To put on trip ropes a strong surcingle, four 2-inch

and pet him. Repeat until he starts and stops the rig without becoming frightened. Dismiss your assistant as soon as possible so that the colt's attention may not be divided between two authorities. Before the colt is driven on busy highways he should be "city broke".

Breaking to Ride

When a horse is to be used for riding it is well first to break him to drive single and double. This will make him quieter to ride.

Horses usually buck through fear. In breaking one to ride, take plenty

sharply to one side; do not let him get it down. The first few rides should be in a small inclosure.

The gaits should be taught separately. The first few rides should be the walk; next teach the trot, and then the canter. Spurs should not be used until the horse is well broken. Most saddle horses can be taught to rack. To teach a horse to rack, he should be shod with light shoes or none at all in front and heavy shoes behind. Sitting well back in the saddle, just force the horse out of a walk and he will soon rack. Keep him at it for only a short distance at a time, as it is a new gait to him and tiresome at first. After the gait is learned the duration of the lesson may be gradually lengthened.

Suggestions

In the preceding instructions principal emphasis has been laid on kindness to the horse. In reality the whip is of equal importance with kindness. To be submissive to a man's will, the horse must fear the consequences of disobedience. There will be clashes, but the horse must be convinced that man is his master. Always, if the horse cannot do or be made to do what is asked of him, make him do something else. As long as he is not allowed to do what he himself chooses he will consider man his superior and master.

Never work a colt after he is tired. By heeding this precaution you prevent obstinacy and render him a willing and obedient pupil.

Training should be given in a quiet place, where the colt's attention will not be distracted from the work in hand by other horses or strange surroundings.

Whenever two people are working with a horse they should be on the same side. The horse's attention is then undivided, and if he plunges or kicks he may be controlled with less danger to the trainers.

To harness or saddle a horse it is customary to approach his near or left side, also to mount from the left side.

Never approach a horse without first gaining his attention. Always speak to him before attempting to walk into a stall with him.

Note.—The next article on colt training will take up Bad Habits, How to Throw a Horse, with notes on the Harness.

The Navicular Bone and the Frog

JOHN DENBO

Having never yet seen a sectional diagram of the front foot of the horse that showed fully the real

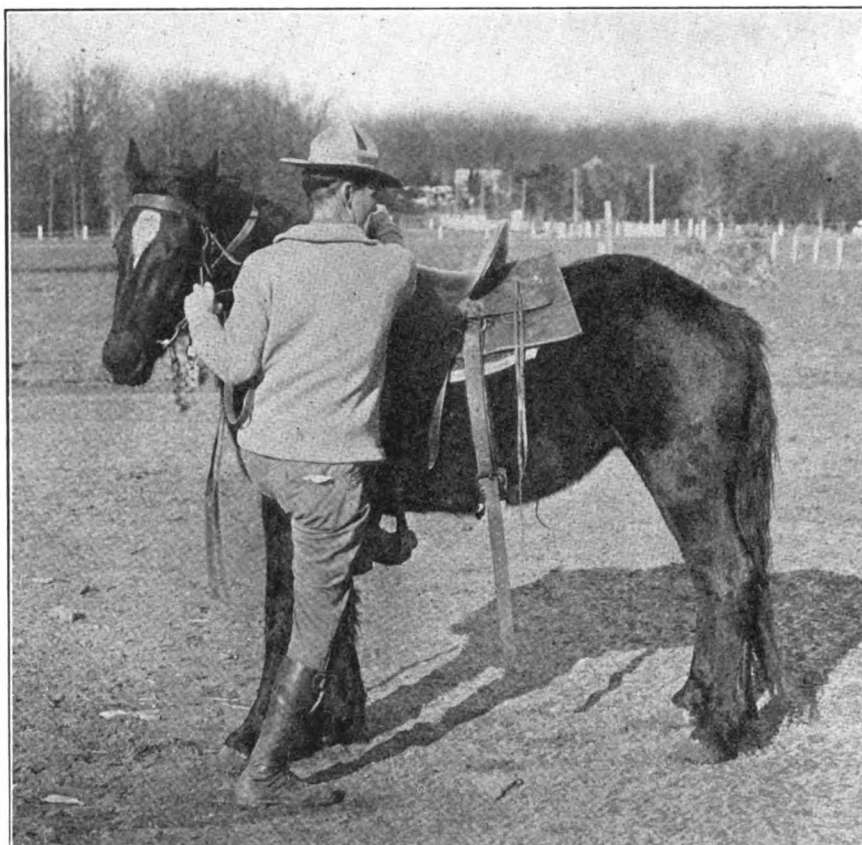


FIG. 8.—GET THE ANIMAL ACCUSTOMED TO BEING MOUNTED

iron rings, two straps to go around pasterns, and a rope about 25 feet long are needed. Fasten two 2-inch rings to the underside of the surcingle and put straps with rings on front feet. Run end of rope through near ring on surcingle, through ring on near foot, up and through off side surcingle ring, down, and tie to off fore foot. A pull on the rope when the horse steps will bring him to his knees. This appliance may also be used to teach a horse the meaning of "whoa." Always use knee pads or have the horse on soft ground, where he will not injure his knees.

When the colt is hitched the driver should get in the rig and have the assistant lead the colt. Start him quietly, drive a few steps, stop

of time and do not frighten him. Put on the saddle and lead him around until he becomes accustomed to it. Do not have the girth too tight. The horse may be tied up for a time and later turned into a paddock with the saddle on.

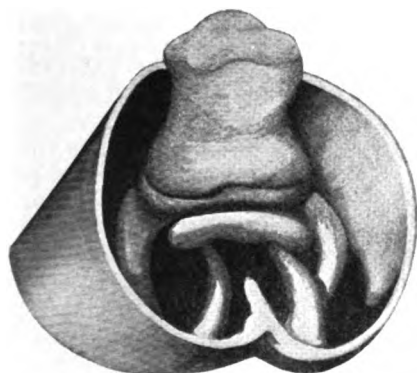
Next accustom the horse to being mounted, getting on and off a number of times (See Fig. 8.) The assistant should have a lead rope tied around the horse's neck and run through the rings of a snaffle bit. If the horse attempts to play up, punish him with a jerk on the bit. Let the assistant lead the horse with rider around until the horse is familiar with the weight on his back, then dismiss the assistant. If the horse becomes rebellious, pull his head



shape of the navicular bone, I want to show one. I've heard it referred to as "the round bone lying behind the jointing of the coffin bone and lower pastern bone." That is where it lays, held up by ligaments. These ligaments hold it in place and this bone supports or keeps forward the joint, behind which it sets. The navicular bone is located across the point of the frog and is attached to the lower end of the pastern bone, between the wings of the coffin bone. The lower pastern bone rocks on the socket of the coffin bone, and every movement of the foot brings into play all of the bones, the navicular bone having an upward and downward movement.

When the foot is contracted, the navicular bone is not permitted to make its full stroke. If the contraction of the foot is severe the action of the navicular bone is almost entirely retarded, and the consequence is that the horse steps along often knuckling over and sometimes falling down.

Thus we see the prominent part this navicular bone plays. It is the most important factor of sensitive



THE NAVICULAR BONE LIES BETWEEN THE WINGS OF THE COFFIN BONE

locomotor apparatus. Unless the difficulty in the action of this bone is not looked after in due time, navicular disease sets in and the horse has gone to the bad.

The most important, the least understood, and the most neglected feature of the foot is the frog. Not 50% of the race horses are shod to admit the proper use of the frog. The frog is pared down, the shoes are set so that all the jar and concussion is met by the outer wall of the foot. When the frog is not given an opportunity to act its part, the heels and quarter are bound to contract and narrow up. Horses running out on pasture without shoes never have contracted feet.

Now a short sentence in regard to

the navicular bone again just in order to get some of the young boys that are beginning to shoe to see a little clearer all sectional views. As I have said before, the usual prints are somewhat misleading as to the proper shape of the navicular bone, so I will make a sketch, making it plain to the boys, and they can read and see what happens when the foot becomes contracted. Yet you must remember that this bone is just so long, and must go in just so much. The place nature gave it is plenty big enough, if something does not happen to make its working space smaller.

For navicular trouble I shoe with a raised heel, no toe, using a bar shoe, with three nails on a side well up towards the toe, not coming back any farther than less than half-way from toe to heel. With the last nail make the bar bear heavily on the frog. If the horse shows lameness, let him go for a few days using nothing but raw linseed oil and pine tar, and put it on twice a day. Linseed oil is good itself without the pine tar. When you reset the shoe, be sure to make the bar press well on the frog. Don't let your nails come back any farther than less than half-way and put your tip on the shoe in front, if you like. Don't expect to use him in a few days, either. If you can see a change for the better in a month or six weeks, you are getting along fine.

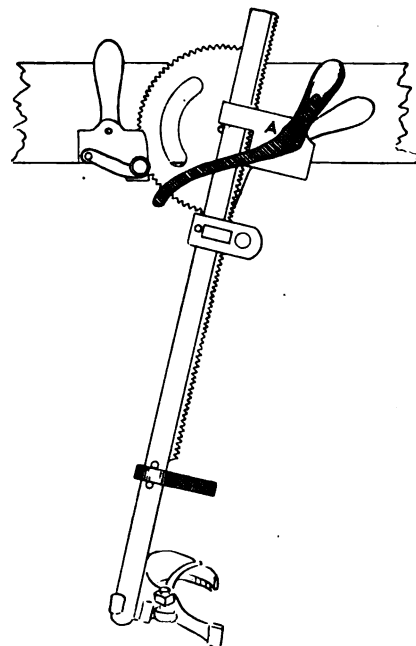
You must understand that when the pressure comes on the frog, the foot will open out at the heels. So don't put nails clear back to his heels and clamp his foot so that you can't accomplish what you intend to.

An Attachment for the Barcus Shoeing Stock

PHILO BUNDY

A great fault with the average shoer when he buys a horse stock is that he puts it up and then waits for a mean horse to come in. That is the wrong way in my estimation. When I put up my stocks I immediately went out and got a good, gentle

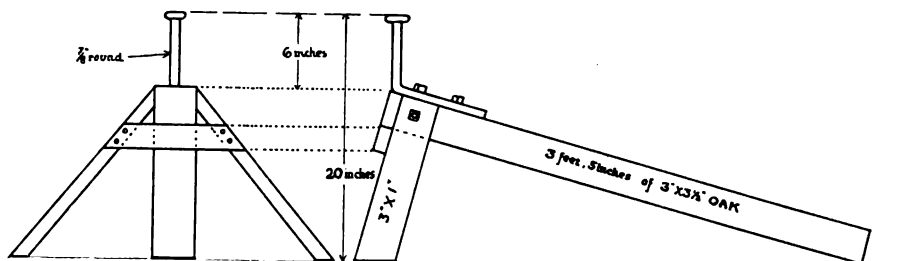
old horse, and with the instructions in one hand, I proceeded to put him in the stocks. I practiced with the foot clamp and looked into every de-



AN ATTACHMENT FOR THE BARCUS HOLDING ARM

tail. It was some weeks before a horse presented itself at my shop that was fit for the stocks. But I was ready for I had had a month's practice and knew just how to put him in. I went at him slow, he being a very mean one, and I was just exactly one hour and 30 minutes getting him done. I was not hurt nor was the horse. I had had these stocks several years now and like all other machinery, it was open to improvement. This improvement is a help and I will give it to the craft.

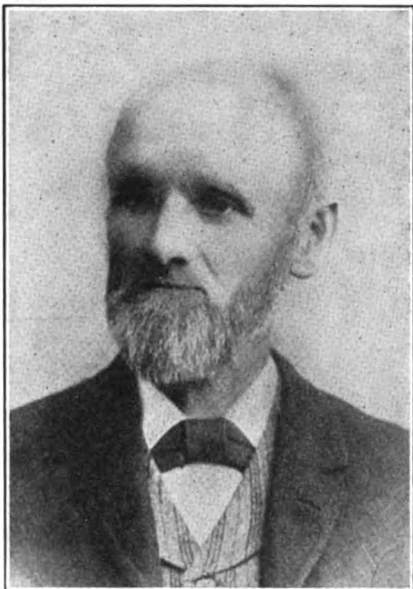
First: On the arm that holds the clamp of the Barcus Stock put a handle. This is done by turning an eye on a $\frac{3}{8}$ -inch rod (don't weld the eye). Put it on the arm, allowing it to be loose enough so you can turn it. Now on this put a wooden handle, say $3\frac{1}{2}$ or 4 inches long. Put threads on the eyebolt so that if the handle gets too loose you can tighten it up. Let the lap of the eye



ANOTHER STYLE OF FOOT REST. THIS ONE IS SUGGESTED BY MR. PHILO BUNDY



go up into the handle, say 2 inches. This handle goes between the foot clamp and the lugs as in the engraving. Now the little lever on the shoeing arm, as shown in the sketch, is also very useful. When you go to catch the foot, the horse sometimes



THE LATE FRANKLIN H. GRUBER

moves, and then you have to set the machine over again and to do this takes some time. But with the handle on the arm (with a small pin below and above it to prevent slipping up or down) and this little lever on the lock handle, you can adjust it in a few seconds.

The lever, A, can be made out of a piece of top railing from a buggy top, using the eye that the bolt goes through. The bolt that holds the dog lock takes this piece and then you bring it to the angle so that when the dog is closed the piece, A, will be away from the arm enough to give it enough play to open and close the dog. After you have put on these attachments catch the handle with the right hand, and pull down on the dog handle, A, and you will catch onto the idea. Make the A piece come in towards the arm to be out of the way of the key handle and see that the A piece is long enough to give easy leverage.

Turning Iron Into Steel

A Leaf from the Lumber Camp Blacksmith's Book of Experience

DAYTON O. SHAW

While waiting at the station for a train, I was introduced to a smith who was going north to work in a lumber camp. The incident called me back to old times when I, too, listened to the crash of falling trees,

and the booming of logs on a frosty morning, sounds which reminded me of the sea breaking on a distant shore.

At many of these stationary saw-mills, the smith will find a good shop, and tools and one or two helpers. He will be kept busy and if he is not something of a machinist, he will be kept guessing, too. But the lumber camp that I refer to, is away back in the forest where the "Lumber Jacks" chop and draw the trees to some lake or river bank, and then they are rafted in the spring down to the mills below. What few tools you will find there have been thrown away by some former smith. You may be able to use the anvil and vise, but the die plates you cannot use and don't try to use them; make new ones. There is one thing that may be a help and that is an assortment of new bolts. Pick out one of each size, file a clearance on the thread of the bolt for a tap, also the nut for a die; now we have an iron tap and die to be made into steel.

We will not go so far away from things in general but that we can find some bone or leather or hoof parings, also salt and charcoal. Char the bone over the fire, then pound it up fine; also pound the charcoal fine. Now to four parts of charcoal, use two of bone and one of salt. As we have no packing box, let us make one. Make some clay mortar. If you cannot get clay make a mortar of wood ashes, and salt. Next take a piece of wood two by four inches, and eight inches long. Cover one side with the mortar to a depth of one inch. Now take a round stick of wood seven inches long and three inches in diameter and place it upon

the mortar on the two by four and then form your mortar one inch deep all around and over one end of the stick. Now place the mortar and stick on the fire, pack charcoal carefully around it and heat it slowly. By the time the centre wood is burned out, the box will be ready for business. After the box is cool, stand it on end, drop in a mixture of charcoal and bore one inch deep. Put in the pieces you wish to harden, then cover with your mixture and seal the end. The last thing at night, put the work into the fire and heat it to a red and cover with charcoal. Then bank it over with charcoal until practically air tight.

The next night do the same. If properly done, this will be sufficient for taps. For other tools you might need more hardening. Now you can harden your work and draw the temper the same as for tool steel. Perhaps the reader will think that the lumber camp blacksmith has a great deal of time to experiment. He has, for his work will not average over two hours a day for the company.

A Family of Successful Blacksmiths and Wheelwrights

H. WINSLOW FEGLEY

Fifty-six years ago, the late Franklin H. Gruber and his brother Isaac, conducted a little blacksmith shop at Mt. Pleasant, Berks county, Pennsylvania; after Franklin had learned both the blacksmith and wheelwright trade with John Henry, a well known blacksmith of his day, whose shop was near the Corner



JACOB H.

THE THREE GRUBER BROTHERS

JOHN H.

GEORGE P.



Church in Heidelberg township.

Franklin Gruber placed shoes on horses, tires on wheels and completed wagons for a number of years, when the lure of "back to the farm" got the better of him and he went back to farming—the trade of his father. While living on a farm the neighbors asked him to repair their wagons and place new tires on the wheels, that he finally erected the first blacksmith shop at Mt. Pleasant. Soon work came in such quantities that the little shop was entirely inadequate and an addition was made. To the blacksmith shop was added a wheelwright department and apprentices were engaged to assist. For ten years, the business steadily increased and in 1884 it was necessary to rebuild the plant and four of his sons learned the trade; and every one was a master mechanic in his line, whether at the anvil or at the wood-bench.

Mr. Gruber had five sons, Adam, John W., Jacob H., George P. and Levi Franklin. The last named became a minister and now serves as pastor of a Lutheran church in Minneapolis, Minn. The other four brothers adhered to their trade



THE PLANT WHERE GRUBER FARM WAGONS ARE MADE

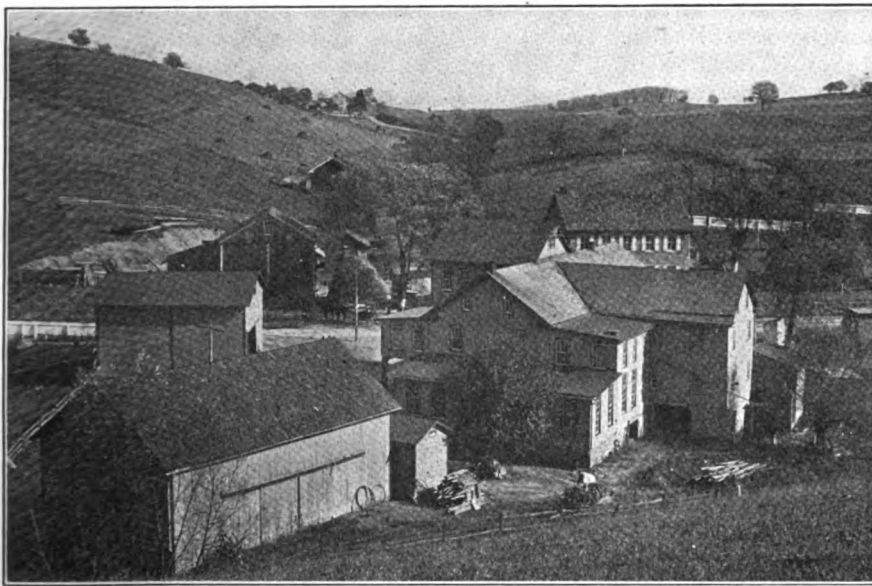
adjudicate the estate of their father and founder of the plant, and since January 1, 1904, the business has been in the care of the three brothers and is now known far and wide as the Gruber Wagon Works.

George P., is the blacksmith and has charge of the iron department of the works. To him it matters little whether it is the placing of a tire on a wheel, the finishing of a farm wagon or the intricate repair work at an automobile engine,—for

unique among the blacksmith and wheelwright fraternity of eastern Pennsylvania. They built their foundation upon the faith they had in their work. "Honest toil and honest labor with honest goods", was their slogan. They did not cater to trade that came from a great distance. They worked for their neighbors and their friends, but when they sold the first Gruber farm-wagon, designed by their late father, the corner stone of their future success was laid. So well was this farm vehicle built, that to-day, the Gruber Farm Wagon is a household word among the farmers of Berks, Lebanon and Lancaster counties. Their name on such a wagon is a "stamp of excellence" and when the purchaser sees it, he asks no more questions, because he knows that he gets 100 per cent. of value for what he pays.

At first the three brothers did all the work. The demand for their goods became so great that now there are a score of men always at work in both the blacksmith and wheelwright departments and the Gruber plant has grown into a big shop, and surrounding this plant have been erected a number of dwelling houses, so that the place represents a little village—though Mt. Pleasant is a quarter-mile from the plant.

When the father started work at this place, the waters of Licking Creek furnished all the power he needed in the blacksmith shop. As the sons increased the business, they added a fifteen-horse power gasoline engine and equipped every department with the latest machinery for working both iron and wood. The chief product of this plant are farm wagons of various types; such as one-horse, two and four-horse, and they are sold from \$60, to \$100 for the heavier ones. They have become



A BIRD'S EYE VIEW OF THE GRUBER PLANT AND ITS SURROUNDINGS

which they learned from their father.

This founder of a unique blacksmith and wheelwright trade, that arose like a mighty oak from a little acorn, died in 1889 and to the four sons was bequeathed the task to continue it. In the fall of 1903, Adam, one of the four sons, was killed in a runaway accident at the Blue Marsh bridge, a mile from their industrial plant. This made it necessary to

he is a mechanic equal to the task. Jacob H., is the wheelmaker, and as far as constructing running gears, he fills the bill, whether it means a pleasure carriage, a surrey or a Gruber farm-wagon. John W., is the manager of the wheelwright shop, and when it gets to woodwork of any kind, he is master among all his tools.

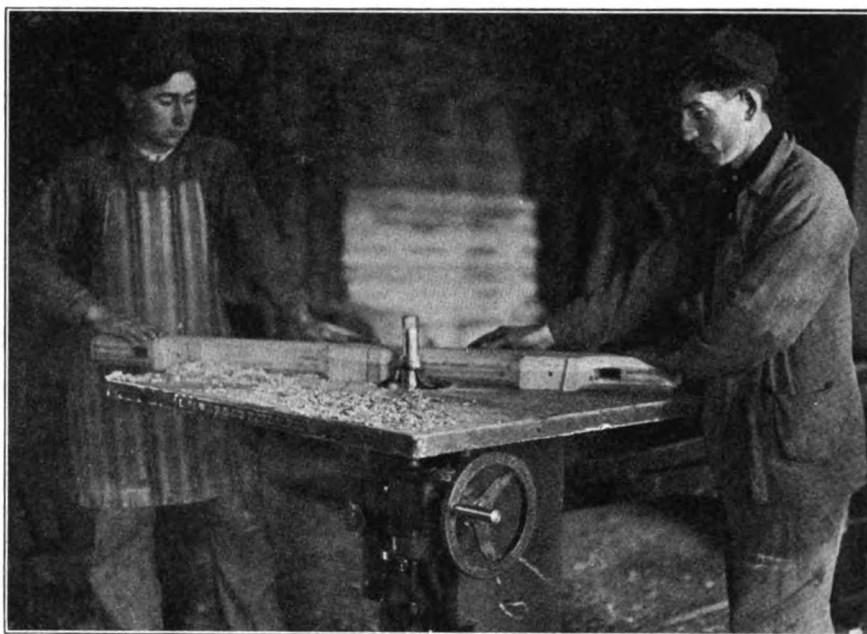
These three brothers, little by little established an industry, that is



of such a high standard, that farmers who ten years ago purchased wagons from these three veteran mechanics realized—when they happened to retire from farm life—more than they paid for them. In one case one of these wagons was purchased from this industrial establishment when finished for \$100 and six years later sold for \$125.

Seasoned lumber and nothing else is used. Lumber is often ten to fifteen years old, before it is worked into spokes, rims and wagon beds or hubs. They have always lumber on hand that will be sufficient to operate for ten years, so they never put a "green" piece of lumber into any wagon. This helped them to establish a reputation, which others have greatly envied, when they had the Gruber brothers as competitors.

The Gruber family of iron and wood-workers come from an ancestry that originated in upper Germany. The word is closely connected with the German word "grube", meaning a pit or ditch and was applied to such persons that worked in mines. The emigrant who came to this country was Nicholas Gruber who settled in Bucks county. Heinrich Gruber was the first to come to Berks county, Pa. They were always hard working people. During the Civil and Spanish American wars the Grubers took a most prominent part. Members of this clan, spread to-day all over the Union, participated in the chief battles from the Potomac to the Mississippi. They took part at Gettysburg, they endured the hardships at Andersonville, Belle Island and Libby prisons; they aided in the destruction of Cervera's fleet, when



IN THE WOODWORKING SHOP OF THE GRUBER PLANT

the Spanish were bottled up in Santiago's harbor.

Grubers were not only strong and muscular through anvil exercise; but others of the clan were musicians. One of the forefathers' a most noted one, Franz Gruber, the schoolmaster at Arnsdorf, near Salzburg, Austria, set to music that pretty Christmas carol, written by Joseph Mohr, of Salzburg, in 1818, and its tune is known all over the world, when the words of the first stanza are recalled:

"Stille Nacht, Heilige Nacht,
Alles Schlaft, einsam wacht
Nur das traute hochheilige Paar,
Holder Knabe in lockender Haar,
Schlaf in himmlischer Ruh'".

This musician's son, also named Franz, became the founder of two musical societies at Hallein, Austria, and composed sixty pieces of music, some of which were printed. He was a famous violinist.

Another clan of Grubers became famous as painters at Vienna, Austria, and still another branch as authors in Germany and England.

However, the majority of the clan in Pennsylvania devote their time to the life as farmers, businessmen and to the trades—they being especially predominant among iron workers, wheelwrights, woodworkers, carpenters and cabinet makers—while the professions also number the Grubers among its most noted members.



A CORNER OF THE SMITH SHOP AT THE GRUBER FACTORY

Collecting by Mail

W. B. PARKER

Slow and bad accounts cause the average business man much annoyance and loss, and are often the direct cause of bankruptcy. It therefore follows that any method of handling this class of accounts that shows a maximum of efficiency with a minimum of effort, friction and expense is worthy of serious consideration.

This article will outline a system that is the result of over fifteen years' experience of an attorney and credit man for several large business houses. It is adapted to either a large or small business and has "made good" wherever adopted.

The basic idea is that a business man can, in most instances, handle his own collections to better advantage than by turning them over to



collection agencies or others, and that it is neither necessary or politic to use bluffing or intimidating methods.

It has been found that the basic elements of a successful collection system are persistency and courtesy, not bluff and threats. You know that a severe storm, or a series of

leaving a correct list for the next mailing.

Letter No. 1

Mr. Slow Pay,
Chicago, Ill.

Dear Sir:—

In looking over our books today we find a past due balance standing against you in the amount of \$....., running back to.....

Will you kindly mail us your check for this amount or advise us at once if you find the balance incorrect.

Thanking you in advance, we remain,
Yours very truly,

Letter No. 2

Mr. Slow Pay,
Chicago, Ill.

Dear Sir:—

We wrote you regarding a past due balance on your account of \$....., running back to, and so far have received no reply.

Please let us hear from you at once so that we will know whether you consider the balance correct, and when we may expect your check.

Yours very truly,

Letter No. 3

Mr. Slow Pay,
Chicago, Ill.

Dear Sir:—

Our letters of and regarding a past due balance of \$..... on your account remain unanswered.

It certainly seems to us that you might at least grant us the courtesy of an answer, even if it is inconvenient for you to send us your check just at this time.

Kindly favor us in this regard, and oblige,

Yours very truly,

Letter No. 4

Mr. Slow Pay,
Chicago, Ill.

Dear Sir:—

We are much surprised at your failure to answer any of our several letters re-

garding your past due account. Our letters have certainly been courteous and we feel that we have treated you fairly in every way.

You know, of course, that unless we hear from you we will be compelled to adopt other means of collection, which we very much dislike to do.

It will save both of us useless expense and annoyance if you will let us hear from you at once, stating just what you propose to do.

The writer will hold this account on his desk until the morning of....., and will depend upon hearing from you by that time.

Yours very truly,

Letter No. 5

Mr. Slow Pay,
Chicago, Ill.

Dear Sir:—

As we did not hear from you this morning we have fully decided to take other steps to enforce settlement of that past due account.

However, a business acquaintance advises us that he believes you to be entirely prompt and reliable, and we have therefore decided to wait a few days longer.

You must certainly realize that your credit standing depends on your fair dealing, and fair dealing certainly requires you to answer our letters.

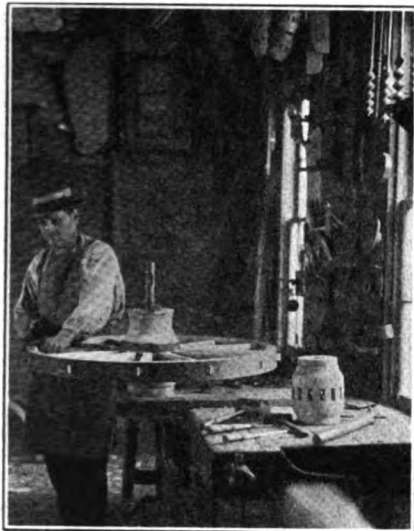
Of course, we realize that it is entirely possible that you have neither received or read our previous letters personally. In view of the statement referred to above we shall expect to hear from you at once.

Yours very truly,

Postal Card Form

We wrote you,, and No reply. Why? It is important that we hear from you at once.

Send the letters weekly and cards every other day for 20 days, following letter No. 5, allowing three days for answer to last letter. Fill in the blank spaces in the second line of card form with the dates of



JACOB H. GRUBER EXPERT WHEEL
MAKER

them, will have small effect on stone while a constant dropping of water on the same spot will wear it away.

The system here outlined consists of five letters and a legal postal card follow up system, and will keep after the slow debtor over forty-five days at a total postage cost of not exceeding twenty cents. The forms given for the letters are to be written on the letter heads of the business house using them and the card form on ordinary government postal cards. They will not be nearly as effective if printed and afterwards "filled in" and they are so short that it is not at all necessary to do so, even where several hundred accounts are involved, as only twenty-five minutes of a typist's time is required on any one account, even if it is necessary to continue the system to the very last card, which will very seldom happen.

When intending to use this system on a certain number of accounts, it is best to make an alphabetical list of them on a long sheet of paper, noting the name, address, amount and state of the last item, leaving about an inch of blank space after each account in which to note the dates of mailing the form letters and cards. When an account is paid or satisfactory arrangements made, it should be crossed off the list, thus



THE GRUBER BROTHERS, THEIR WORKING FORCE AND ONE OF THEIR
WAGONS



the five preceeding letters, as 1/1, 1/7, 1/14, 1/21, and 1/28, thus making a solid second line of dates, *in figures*. Add nothing to the wording of card form except signature, which should be written with pen, down toward right hand bottom corner of card; do not date. The letters should be single spaced between lines and double spaced between paragraphs.

It will be noted that the first three letters are very short indeed, and yet they say all that is necessary or advisable to say at this stage of the correspondence, and also ask a ques-

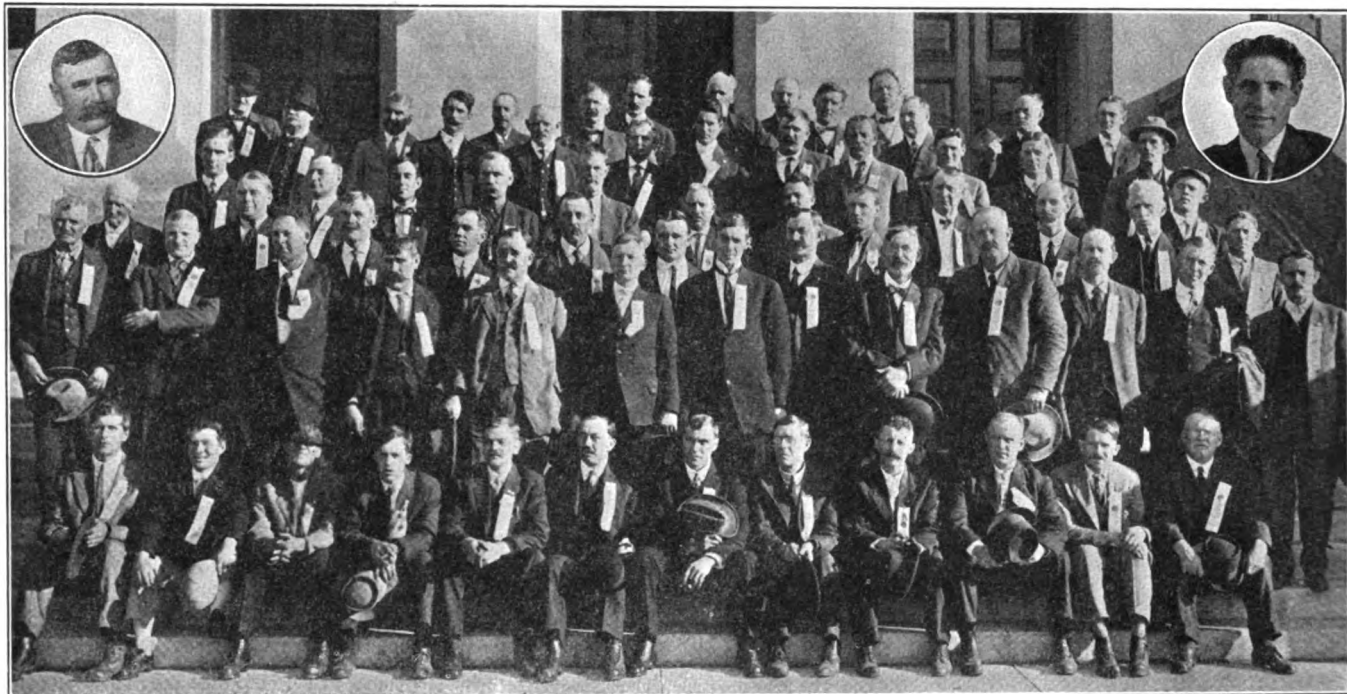
tion that demands an answer whether the debtor is able to pay just at that time or not. They are so mild that they can be sent without giving offence, to perfectly good, but slow, debtors and yet they form an effective basis for the letters that follow to the slower and more doubtful debtors.

But some men do not read letters and it does not much matter what you write them. Here is where the postal cards come in. While they say nothing whatever about an account, and are consequently perfectly legal, yet they furnish an inexpensive form of persistency that certainly does get results.

In conclusion, it is emphatically stated that this system will not get money from a man who has none, or secure any other impossible result,

sociation secretary, S. P. Johnson.

Excellent reports were made by the various committees, and a very successful meeting was held. A number of very good addresses were heard; Mr. W. H. Thompson, speaking on Organization; Mr. J. H. McCord, speaking on the subject of Farmers buying Goods as Cheap or Cheaper than Blacksmiths; Mr. M. C. Spethman addressed the convention on Horse Nails and Their Making, while a number of other subjects of interest and practical value to blacksmiths were employed.



THE BLACKSMITHS', HORSESHOERS' AND WHEELWRIGHTS' ASSOCIATION MET IN CONVENTION AT GRAND ISLAND, NEB., AND HERE IS THE FINE LOOKING BUNCH OF LIVE WIRES THAT ATTENDED. MR. G. S. FISHER (IN LEFT CIRCLE) WAS CHOSEN AS PRESIDENT AND MR. C. C. GOOD (AT RIGHT) WAS CHOSEN SECRETARY-TREASURER BY THESE LIVE CRAFTSMEN

tion that demands an answer whether the debtor is able to pay just at that time or not. They are so mild that they can be sent without giving offence, to perfectly good, but slow, debtors and yet they form an effective basis for the letters that follow to the slower and more doubtful debtors.

The fourth letter takes the place of the usual "threat to sue" letter, and is fully as effective, without committing the writer to any definite action whatever, but leaves the matter open so that he can effectively continue his mail campaign. The fifth letter is a reversal of the "Threat to list" or let other business men know of the indebtedness, and is even more effective without being offensive. It flatters instead of threatens and winds up by giving

but it will bring in the most money out of the past due hundred dollars, if used according to instructions, and it certainly will not involve the user in unnecessary expense or useless litigation.

The Ninth Annual Convention of the Nebraska Blacksmiths, Horseshoers and Wheelwrights' Ass'n.

The ninth annual convention of the Nebraska Association was held at Grand Island, Nebr., October 20th and 21st. The convention opened at 10:30 A. M. with the following officers present: Robert McIntyre, president; Jens Miller, vice-president, and C. C. Good, acting secretary in the absence of the regular as-

The officers elected for the next year are as follows: Mr. G. S. Fischer, President; Mr. Jens Miller, Vice-president; Mr. C. C. Good, Secretary-treasurer. A board of managers consist of Mr. J. H. McCord, Mr. J. C. Work, Mr. Robert McIntyre.

The secretary reported 21 new members with quite a number of members paying their dues for several years in advance. The meeting for October, 1916, is at Hastings, Nebr. The accompanying engraving shows the men who attended the Nebraska convention.

Thoughts on Timely Topics

By THORNTON

HERE WE ARE on the threshold of another year, which causes us to



remark that several thousand men have sprained their wrists in turning a new leaf and that those same thousands are due a swat in the eye when said leaf suddenly flops back into place again most any time between now and the middle of February.

AND NOW, ON THE DOOR STEP OF 1916, if we could only look into the coming year and see what was going to happen! If we could only see what changes, what advances were going to occur in the craft! We cannot do this—we cannot see clearly very far, so we must take our lessons from the past year and grope as best we can. But let us not disregard the past—let us learn from it and as well as we can, figure the future accordingly.

THE TRUTH—did you ever think how often we ask for the truth, how seldom we get it and how seldom we really want it? For example, you ask a friend for his opinion on some pet project of yours. Usually it is something you are particularly well satisfied with, something you want to be slapped on the back for, something that you feel should place your name in the Hall of Fame. Now then, the fat is in the fire as the pork barrel advocates would say. You've explained the thing to Mr. Good Friend and then you sit back, throw out your chest, slip a thumb into each armhole in your vest and say: "Honestly now, Old Top, what do you think of it?" And if said friend doesn't think much of it, and honestly says so, you immediately class him with the dip-lo-do-ki of the middle ages and straightway suggest a committee of alienists to look into the saneness of his sanity. The average person doesn't want an honest expression on any subject—he wants only what he wants. He wants to hear only what will please him.

And carrying the dope along to the business of smithing and such like, isn't it usually this very same tendency in the human animal that makes the blacksmith close his eyes to the hard true facts of his business? The average business man and a good many of them are smiths, don't want to know that their business is not paying them a profit. They prefer to go on day after day and year after year—or as long as they can and jolly themselves into the idea that they are doing a profitable business. And yet were they to stare the truth in the face they would probably be saved many later moments of

worry and discomfort financially.

In closing, just remember that this is perhaps not the kind of matter you wanted to read—it won't tickle your conceit—but, it's fact.

THE MULE is an unappreciated animal that was best described by the late George Fitch who called it "a parody on the horse". Which by the way is not many miles from the real truth. Some day some poet with a Kiplingesque feeling for the humbler necessities of earth is going to immortalize his highness, the Mule, in an immortal set of verses on the now famous Gunda Din style of architecture. But said poet, to rightly appreciate the subject of his verse, will need to know said critter in his various roles in war, peace and agriculture. He will need to be a composite of a cavalry-man, an artillery-man, a teamster, a stage-driver and a farmer, will this poet. He will need to know and to appreciate the sportive humor of the mule and to see the delicate difference between this animal's display of well-directed spitefulness and rightly-intentioned playfulness. He will need to be ready to command something more than the average man's vocabulary in order to properly voice the blasphemy that is heaped upon the head, shoulders and hide of said "parody on the horse". He will need to know something of the cussedness of the "Mauds" in the mule world—the fighting ability of the "Devil's" and the faithfulness of the "Mack's."

And then when it comes to real, hard, muscle busting work, the mule has it over the horse, as Niagara Falls compares with the outpourings of a garden hose. He'll pull more load on less eats and cost less in vet. service than any other animal except the Modernius Autocus Fordii. His footing can be compared to nothing other than that of the eagle's, and even at that some folks, who know, say that the mule will follow where no eagle dare lead. His outer covering is like unto granite—weather proof, tough and everlasting. Nothing, outside of dynamite, has yet been discovered that has a permanent effect on the hide of the mule.

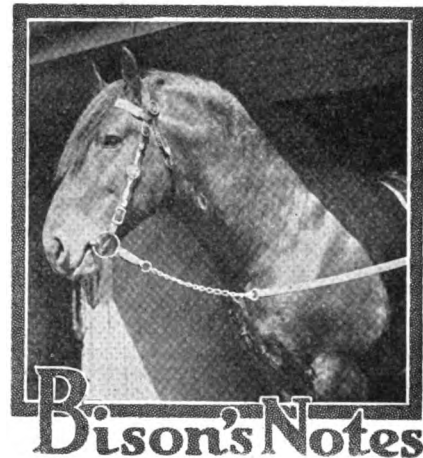
Here's hoping for the appearance of the masterpiece of poetry that will immortalize the mule—that will send a word picture of his royal mulenness jogging down the towpath of the canal of time—a word picture that will truly represent him for all time.

Convention of the Kansas Blacksmiths, Horseshoers and Wagon-makers Association.

With President Perry R. Buckley presiding, the blacksmiths, horseshoers and wagon-makers of Kansas opened their annual convention November 10th, at Independence, Kans. The convention is reported as a most successful one and the membership of the association has increased 105 during the past year.

Besides the usual helpful and interesting business sessions and business discussions, the delegates to the convention at Independence enjoyed a number of social affairs that made the meeting a most enjoyable one.

The officers elected for the coming year are: Mr. Ed. Bohrer, President; Mr. Harry Overfield, Vice-president, and Mr. Austin English was again re-elected as secretary-treasurer. Topeka, Kans., was selected as the place of the next convention.



The famous pacer William, 2:00, as a colt wanted to trot but could not show a great deal of speed at that gait. Contrary to the general custom he was shod with heavy shoes to make him pace. For a time, in his two-year-old form, he carried twenty-four ounce shoes and four-ounce toe-weights. When he first appeared on the turf as a three-year-old he had on thirteen-ounce shoes and three-ounce toe-weights, but by the end of the season the weight of his shoes had been reduced to ten-ounces, with the same three-ounce toe-weights. Last year when he electrified race goers by his marvelous speed in the opening meeting of the Grand Circuit at Cleveland he wore ten-ounce shoes and wore three-ounces toe-weights, but at the close of the season his shoes had been reduced to eight and one-half ounces. This year he is shod with six and one-half-ounce shoes and wears two-ounce toe-weights, which is about twenty ounces less weight than he carried when his education was commenced in his two-year-old form. The weights referred to mean, of course, the weight carried on each front foot. The kind of shoes which the great pacer wears weight four and one-half ounces and both hind shoes are bar-shoes.



The Wonderful Helper

WITH APOLOGIES TO EMMA A. LEUTE,
IN FARM JOURNAL.

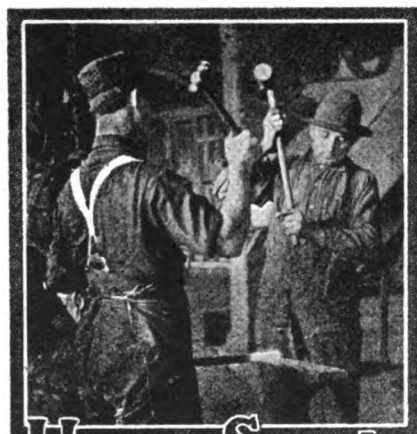
"I want a boy", said Blacksmith Brown,
"to help me do the work;
I'm tired of drudging all the time. I feel
I'd like to shirk
The everlasting forge and shop and save
my tried feet—
Though boys are mostly ne'er-do-wells,
and want such heaps to eat."

But when the blacksmith told his need,
straightway a boy was found;
A wonder-boy he surely was and nice to
to have around.
But when a week or two were passed he
showed some bossy ways,
And Blacksmith Brown just sat around
and watched him in amaze.

He cleared the shop of rubbish-heaps and
threw out useless scrap
"Because," he said, "the stuff's no good
and isn't worth a rap."
He fixed the roof and walls and floor and
brightened up the sign
Until he had that shop of Brown's just
look spick and fine.

He set Brown's books in order too and
sent out bills galore,
He was a smarter boy than any Brown
had seen before.
And the old blacksmith blessed his stars
and rested day by day,
And never grudged the heaps to eat nor
what he had to pay.

But suddenly the charm was gone; the
old man rubbed his eyes
And waked to find it was a dream and
just a sad surprise.
The blacksmith rose and stretched and
took his book from off the shelf,
And said: "He was the very boy that I
was once myself."



Heats, Sparks, Welds

Save yourself both money and worry by
keeping the dead-beat in mind and not on
your books.

Can you buy as much with the dollar of
today as you could with the dollar of
10 years ago?

Louder than the ring of your anvil
speaks quality and satisfaction. Deliver a
good quality of both with every job you
turn out.

A good time is no wto cut off unneces-
sary expense and to prune the necessary—
but don't make the fatal mistake of prun-
ing so close as to kill the business tree.

Poor, indeed, is the rule that won't work
both ways—if you haven't enough busi-
ness, advertise; if you have more business
than you can handle, advertise for help.

Appearances alone are not sufficient.
More important is the amount of honest
material and workmanship that go right
into the job. These, and not the painted
skin, tell its true worth.

Astray, will appearances often lead a
man. Clothes may make the man, but a
"high-stepper" may belong to a "dead-
beat" and the owner of a great big tour-
ing car may be poor pay.

A precaution of the safety-first order
is the placing of a box of sand in the
engine room these days. It is an excellent
medium for extinguishing gasoline fire and
may prevent a very serious conflagration.

Preparedness in these days is a word
that has been considerably overworked,
but apply it to your business. Ever think
how many failures are caused by unpre-
paredness? Let us not court failure—don't
get caught napping.

Make a better helper of your helper by
asking his help occasionally. Talk things
over with him. He must know something,
or you couldn't have hired him. The really
big man is not ashamed to learn from the
most humble source.

Perhaps you don't know—perhaps you
do—if you are feeding the profits of one
department to keep another from starv-
ing? A good system of accounting will tell
you more than any series of guesses you
can possibly make concerning your busi-
ness.

To prevent yourself from becoming a
back number read the back numbers—file
your copies of "Our Journal." A conveni-
ence for this purpose are the binders offer-
ed by the Subscribers' Service Department.
Ask about these holders for your back
copies.

Your competitor doesn't need your
knocking. If he does poor work, people will
find it out sooner or later, and if his work
is better than yours, they will know it, no
matter what you say. Better by far to
hammer on your own anvil and boost your
own business.

It will surprise you if you haven't ever
tried it. We mean the putting aside of
something every sunshiny day for the
rainy day which inevitably follows. A
little every day or week will amount to
quite a good-sized sum within a surpris-
ingly short period.

Important books of the trade are cata-
logues. Keep them on hand in a handy
place. You will find many of them con-
tain information on your business that you
can get from no other source. A file of
trade catalogues is just as necessary as a
file of the other kind.

Running a smith shop without The
AMERICAN BLACKSMITH is like climbing
the stairs of a forty-story building when
the elevators are running. It is possible to
get to the top without using the elevator,
but it is real hard work. You will find the
operation of a smith shop much easier
with the help of "Our Journal."

They cannot buy, steal or get any other
way, advertising space in "Our Journal".
The quack medicine, fake gold mine, or
any questionable advertisement is not
eligible for appearance in our columns.
Look up our Honest Dealings paragraph

and see just exactly where we stand on
this fake advertisement proposition.

Can you find your name on the Honor
Roll? It is not merely a matter of tick-
ling your bump of conceit, but the greatest
reason is the pleasure it will give your
pocket-book. The saving you can make
by taking advantage of our long-time rates
is considerable if you subscribe for a long
period. Do it if for no other reason than
to please your pock-book.

The pile of money that is being spent
on automobiles is growing by leaps and
bounds every season. Are you getting
some of this "coin"? Our automobile de-
partment will help you prepare for this
business. Would not some of the automob-
ilist's good money be just as welcome as
the horse-owners? Is there any reason why
you cannot add some of this automobile
money pile to your bank account?

Would you allow a man who knows
nothing about the interior arrangement of
your body to cut and hack at any part
of it in an effort to cure an injury? Of
course, you wouldn't—yet there are men
posing as horse-shoers who know little or
nothing regarding the interior structure of
the horses foot, and what is much worse,
they get horses to shoe. Of course, "Our
Folks" know something more about the
horse's foot and leg than what can be seen
on the outside of it.

It's your fault, if after trading with you
once, a man does not continue as a regular
customer; though it may not be your fault
if he never starts to trade with you. Keep-
ing at prospective customers persistently,
energetically, and continuously, and then
following up all that are trading with you
in a similar way will not permit any of
these faults to drop upon your shoulders.

Are you getting all you can? Of course,
you cannot expect to get all of the busi-
ness all of the time, but you won't know it
unless you go after business with deter-
mination.

Look-out, folks, we don't want you to
lose any money. The oily-tongue of the
sharper and faker are always abroad in the
land. When he solicits your subscription
order, insist upon seeing his letter of
authority. All of the men soliciting sub-
scriptions for THE AMERICAN BLACK-
SMITH are supplied with letters which
give them authority to represent "Our
Journal" and these letters are current for
three months only, when the letters must
be renewed. If a solicitor has no letter to
show you, or if his letter has expired,
better tell him: "I will send in my order
direct." Please bear these points in mind,
folks—we don't want you to help support
the smooth tongued sharps.

When tempted to cut prices, think of
the matter on a purely, coldly business
basis. Business that is really worthy of
the name is a matter of mutual welfare.
Business transactions must benefit all
parties concerned. The customer must re-
ceive his money's worth and the merchant
or seller must receive his legitimate per-
centage of profit for supplying the needs
of the purchaser. On this basis price cut-
ting is not business; only one person pro-
fits when you cut prices, and that person
is the customer. When you cut your
prices you cut your profits, you cut
into your competitor's business, you cut
down your revenue, you cut down your
chances of paying your bills, and finally
the jobber cuts you off his credit list.
Then your business throat is cut. If you
are in business solely and exclusively for
your customers, then cut prices.



Our Honor Roll

BUYING TO MAKE A PROFIT

You are in business for profit—profit is your excuse for being in business. You are out for the profit. But it is possible to make a profit by buying. For example: Suppose that when you began to read THE AMERICAN BLACKSMITH that you had subscribed at the long-time rates. You would have made a saving of from 40 cents to five dollars depending upon the length of time you have been reading the paper. Now then, suppose you subscribe NOW for several years. Say five or ten years. By subscribing at one time and paying for that time NOW, you make a profit of \$2.00 on a five year period or \$5.00 on a ten year period. Can you make as high a percentage of profit right in your own shop? Think it over, Mr. Reader. Consider this chance to make a profit on your subscription.

U. S. and Mexico.

2 yrs.	\$1.50 save \$.40	Canada.	\$2.00 save \$.50	Other Countries.	10 sh. save 2 sh.
3 yrs.	2.00 save 1.00		2.70 save 1.05		14 sh. save 4 sh.
4 yrs.	2.50 save 1.50		3.20 save 1.50		18 sh. save 6 sh.
5 yrs.	3.00 save 2.00		3.75 save 2.50		1 £ save 10 sh.
10 yrs.	5.00 save 5.00		7.00 save 5.50		12 14 sh. save 12 6 sh.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no better time than NOW.

NAME	Subscription Paid to
The Fix-It Shop, Utah.	July, 1935
J. A. Torray, Mass.	Dec., 1935
W. C. Watt, Kansas	Dec., 1935
I. J. Stiles, N. J.	Jan., 1939
Waddington Farm, W. Va.	Mar., 1928
J. Taylor, Calif.	Oct., 1928
W. R. Clepper, Texas	Nov., 1925
G. H. Ialey, Mass.	Nov., 1925
Reynolds Bros., Penna.	Sept., 1935
F. W. Krenz, Calif.	Aug., 1935
C. W. Allen, Neb.	Aug., 1935
A. E. Spangberg, Oregon	May, 1925
D. M. Kille, Okla.	Apr., 1925
G. Oullgren, Iowa	Apr., 1925
G. Frericks, Minn.	Mar., 1925
V. Friesmuth, Wisc.	Mar., 1925
E. Price, Ill.	Feb., 1925
D. C. Garber, Ohio	Feb., 1925
J. H. Kurt, Ill.	Feb., 1925
E. R. Hitzhus, Ohio	Feb., 1925
H. F. Schreiber, Penna.	Feb., 1925
C. M. Adams, Conn.	Jan., 1925
J. S. Damm, Iowa	Jan., 1925
J. M. Withers, Hawaii	Jan., 1925
F. H. Jarvis, Ind.	Dec., 1924
Geo. Tatum, Jr., Fla.	Dec., 1924
I. Clark, Va.	Dec., 1924
A. N. Estes, Va.	Dec., 1924
J. Bailey, Man.	Dec., 1924
E. G. Naylor, Md.	Dec., 1924
Halvorson Brothers, S. D.	Nov., 1924
P. Schick, Wash.	Nov., 1924
H. E. Snyder, Ore.	Nov., 1924
J. A. Stewart, Ky.	Oct., 1924
C. Richenacker, N. Y.	Oct., 1924
W. L. Berthoff, N. J.	Oct., 1924
J. W. Hewson, S. Africa	Sept., 1924
Ed. Larson, N. D.	Sept., 1924
R. T. Monk, Ill.	Sept., 1924
W. T. De Young, Ill.	Sept., 1924
Charles Wells, Colo.	Aug., 1924
H. G. Weaver, Penna.	Aug., 1924
Working Men's College, Viet.	June, 1924
P. M. Kenoyer, Neb.	June, 1924
R. C. Frederick, N. D.	May, 1924
H. L. Fenton, N. Mexico	May, 1924
J. Carl, Iowa	May, 1924
J. E. Little, Penna.	May, 1924
H. I. Brenzel, N. Y.	Apr., 1924
W. E. Parr, Iowa	Apr., 1924
F. Sramek, Neb.	Apr., 1924
L. A. Hulien, Calif.	Apr., 1924
A. Hulstrand, N. D.	Mar., 1924
W. F. Riske, Wis.	Mar., 1924
B. F. Seibert, Calif.	Mar., 1924
H. Roschwetter, Mo.	Mar., 1924
W. B. Briant, N. J.	Mar., 1924
A. Bosch, N. Y.	Mar., 1924
A. R. Johnson, B. L.	Feb., 1924
F. Jacobs, Ohio	Feb., 1924
A. J. Ferry, Ill.	Jan., 1924
E. G. Walker, Calif.	Jan., 1924
H. D. Erskine, Vt.	Jan., 1924
E. Fowler, Penna.	Jan., 1924
Green & Son, Ireland	Dec., 1923
M. Lamoreaux, Ohio	Dec., 1923
C. R. Davis, N. Y.	Dec., 1923
F. W. Copeland, Kansas	Dec., 1923
J. L. Tomlin, Kansas	Dec., 1923
H. A. Davis, N. Y.	Dec., 1923
E. H. Tryke, Ill.	Dec., 1923
D. B. Johnson, Iowa	Dec., 1923
E. Horton, Calif.	Nov., 1923
J. Spratt, Mass.	Nov., 1923
F. Watkins, N. H.	Nov., 1923
J. Koppins, Ala.	Nov., 1923
W. C. Lienert, S. Australia	Oct., 1923
W. B. Abell, N. Y.	Oct., 1923
W. R. Turner, Man.	Oct., 1923
C. Nelson, Neb.	Sept., 1923
H. M. Anderfuren, Calif.	Aug., 1923

NAME	Subscription Paid to
Cramp Bros., Texas	Aug., 1923
L. C. Larsen, Iowa	July, 1923
Q. Rfenar, S. Africa	July, 1923
G. L. DeWitt, Mont.	July, 1923
W. W. Gregg, Texas	July, 1923
W. R. Stroupe, N. C.	July, 1923
O. C. Young, Mich.	June, 1923
Otto Sippel, Penna.	June, 1923
A. Chapman, N. Y.	June, 1923
C. Eirely, Md.	June, 1923
F. H. Shupe, Penna.	June, 1923
J. C. Stover, Penna.	Apr., 1923
W. Schoonover, Penna.	Apr., 1923
J. M. Rumire, Iowa	Mar., 1923
Lownsdale Bros., Mo.	Mar., 1923
J. Carwell, Ark.	Mar., 1923
G. E. Glasier, Ohio	Mar., 1923
G. Fath & Co., S. Africa	Mar., 1923
T. Bradley, N. S. Wales	Mar., 1923
L. T. Nedham, Ill.	Feb., 1923
G. C. Disinger, Miss.	Feb., 1923
J. Hughes, Ohio	Feb., 1923
J. Wieber, Minn.	Jan., 1923
Z. A. Enos, Minn.	Jan., 1923
W. G. Wise, Calif.	Jan., 1923
F. S. Bishop, S. Africa	Jan., 1923
J. Curran, Ariz.	Jan., 1923
S. P. Harney, Mont.	Dec., 1922
W. Breckner, Okla.	Dec., 1922
J. Pabins, Neb.	Dec., 1922
P. Frederickson, Iowa	Nov., 1922
L. O. Lelurs, Ill.	Nov., 1922
W. Lawson, N. Zealand	Nov., 1922
W. O. Grant, Cal.	Oct., 1922
W. H. Miller, Iowa	Oct., 1922
A. O. Martin, Idaho	Sept., 1922
A. O. Mortimer, Idaho	Sept., 1922
H. J. Wyatt, Wash.	Sept., 1922
J. N. Skow, Iowa	Sept., 1922
A. D. Standiford, Wash.	Sept., 1922
T. Temkiewicz, Que.	Sept., 1922
A. Pellifer, Ohio	Aug., 1922
W. D. Valentine, Iowa	Aug., 1922
G. Hoffman, N. Y.	July, 1922
J. Erman, Ark.	July, 1922
W. K. W. Hansen, Penn.	June, 1922
Robert Tochter, Cal.	June, 1922
J. Van Marter, N. Y.	Jan., 1922
F. Norris, Yukon Ty.	Jan., 1922
E. Anders & Son, S. Australia	May, 1922
Louisa Carriage Wks., Va.	May, 1922
S. Smith, Tex.	Apr., 1922
J. W. Haas, La.	Mar., 1922
D. W. Smith, La.	Mar., 1922
D. W. Smith, R. I.	Mar., 1922
E. A. Dillon, Nev.	Mar., 1922
D. F. Kuster, Wash.	Mar., 1922
G. F. Johnson, Mich.	Feb., 1922
R. H. Keith, Iowa	Jan., 1922
J. H. Ickes, Penn.	Dec., 1921
E. Willis, Colo.	Dec., 1921
O. M. Johnson, Minn.	Oct., 1921
H. Feldus, Neb.	Sept., 1921
W. F. Kline, Kansas	May, 1921
E. Moesmer, Queens, Australia	Apr., 1921
E. Slee, N. Y.	Feb., 1921
J. L. Jester, Mo.	Jan., 1921
G. A. Moffatt, Yukon Ty.	Jan., 1921
L. F. Kellhols, Pa.	Dec., 1920
F. Markgraf, Minn.	Dec., 1920
S. Wright, N. Y.	Dec., 1920
T. P. Consodine, Mass.	Dec., 1920
F. Strieff, Wisc.	Nov., 1920
L. P. Mortensen, Mich.	Nov., 1920
A. W. Brenneman, Ind.	Nov., 1920
Thomas Scurr, New Zealand	Oct., 1920
W. H. Finlay, New Zealand	Oct., 1920
R. D. Simkins, Penna.	Sept., 1920
L. R. Garvin, Ohio	Sept., 1920
A. E. Reeve, Mass.	Sept., 1920

NAME	Subscription Paid to
F. A. Poole, South Africa	July, 1920
C. Gibson, Ill.	July, 1920
H. M. Wittman, Neb.	July, 1920
The Goldfield Diamond Drilling Co., Victoria, Australia	July, 1920
G. M. Robben, Kans.	July, 1920
R. J. J. Rees, S. Australia	July, 1920
D. Hardy, Viet.	June, 1920
E. Malpas, S. Australia	June, 1920
A. J. Hamburg, Ohio	June, 1920
C. M. Holton, Okla.	June, 1920
C. L. Graf, Ohio	June, 1920
A. Mellum, N. D.	June, 1920
P. Wright, Calif.	May, 1920
F. Greer, Queens	Apr., 1920
C. L. Morman, N. Y.	Apr., 1920
Alex. Zimmer, Ont.	Apr., 1920
Clark Bros., Cal.	Mar., 1920
W. H. Leonard, Penn.	Mar., 1920
Ed. Grimm, Tex.	Mar., 1920
H. L. Place, S. Australia	Mar., 1920
J. Hiernens, Minn.	Mar., 1920
G. S. Akers, Va.	Mar., 1920
J. F. Leiss, N. J.	Feb., 1920
C. M. Jacobsen, Utah	Feb., 1920
P. Bianchi, Texas	Jan., 1920
R. S. Crisler, Ky.	Jan., 1920
T. A. Mahar, Me.	Jan., 1920
T. Horne, Ariz.	Jan., 1920
H. B. Draper, Ind.	Jan., 1920
H. H. Schoob, Wyo.	Jan., 1920
L. A. Costa, Mont.	Jan., 1920
I. Blough, Penn.	Dec., 1919
H. Kraft, Calif.	Dec., 1919
Davayle & Sons, Viet.	Dec., 1919
E. M. Crouch, Conn.	Dec., 1919
R. Werk, Neb.	Dec., 1919
J. R. Wilson, Md.	Dec., 1919
N. Buchanan, Ont.	Dec., 1919
P. Relf, Ohio	Dec., 1919
A. Larsen, Ida.	Dec., 1919
H. Andersen, Iowa	Dec., 1919
I. F. Powers, N. J.	Dec., 1919
J. G. Granlund, Conn.	Dec., 1919
J. B. Horn, N. Mexico	Dec., 1919
A. J. Haun, Calif.	Dec., 1919
A. Clark, Viet.	Dec., 1919
O. J. Wilson, N. H.	Dec., 1919
Booth, MacDonald & Co., N. J.	Dec., 1919
A. Luke, Neb.	Dec., 1919
J. W. Rupp, Wisc.	Dec., 1919
F. G. King, N. Y.	Dec., 1919
J. B. Beaudet, Quebec	Nov., 1919
W. Vallance, N. Y.	Nov., 1919
W. Schaid, Wisc.	Nov., 1919
J. Delane, Neb.	Nov., 1919
P. Gudmunson, S. Dakota	Nov., 1919
R. Ramach, N. W. Ter.	Nov., 1919
J. Nalmsith, N. Zealand	Nov., 1919
W. H. Lick, Ohio	Nov., 1919
W. N. Shofield, Mo.	Oct., 1919
W. H. Spicer, Ky.	Oct., 1919
O. Bourgon, Que.	Oct., 1919
T. Russell, N. S. Wales	Oct., 1919
J. Alston, Viet.	Sept., 1919
M. Pople, N. S. W.	Sept., 1919
A. P. Jones, Col.	Sept., 1919
J. F. Stickel, N. Y.	Sept., 1919
A. E. Reeve, Mass.	Sept., 1919
T. E. Smart, Mo.	Sept., 1919
Schmitt Bros., Ill.	Sept., 1919
W. Clark, S. Africa	Sept., 1919
W. R. Randall, N. J.	Sept., 1919
W. H. Sheaffer, Penn.	Sept., 1919
H. L. Lynn, By.	Aug., 1919
R. Crosswell, N. Zealand	Aug., 1919
W. E. Sheets, Penn.	Aug., 1919
Cooper & Curd, N. Zealand	Aug., 1919
A. Discher, N. Queens	Aug., 1919
E. Underwood, S. Africa	Aug., 1919
E. P. Wambold, Penn.	Aug., 1919
W. F. Turner, S. Australia	Aug., 1919
C. H. Smith, S. Australia	July, 1919
W. Lethetter, Ark.	July, 1919
J. P. Dambach, N. J.	July, 1919
J. T. Wilson, S. C.	July, 1919
J. A. Moffett, Penn.	June, 1919
W. Perrow, South Africa	June, 1919
I. B. Harey, Cal.	June, 1919
Wright, Bong & Co., S. Africa	June, 1919
F. Rass, Sask.	June, 1919
W. H. Hooper, Cal.	June, 1919
G. Jackson, England	June, 1919
E. G. Mulholland, Me.	June, 1919
Vinsten & Duncan, S. Africa	June, 1919
W. F. Helmege, Tex.	May, 1919
J. W. Delmore, Nev.	May, 1919
C. H. McCormack, Kansas	May, 1919
M. Duboise, Miss.	May, 1919
W. Parker, Man. Canada	May, 1919
Ale Pederson, Minn.	Apr., 1919
R. Manake, Tex.	Apr., 1919
Clyde Engineering Co., N.S.W.	Apr., 1919
A. Thompson, Fiji Islands	Apr., 1919
Theo. Paschke, Neb.	Apr., 1919
I. M. Townsend, Calif.	Apr., 1919
G. Bish, Fiji Islands	Apr., 1919
G. D. Gamble, Mass.	Apr., 1919
G. Ingram, Va.	Apr., 1919
J. H. Martin Mfg. Co., Ind.	Apr., 1919
R. H. Kuhrt, Iowa	Apr., 1919

NAME	Subscription Paid to
J. Meyer, S. D.	Apr., 1919
C. N. Anderson, Ark.	Apr., 1919
S. M. Torrence, Ohio	Mar., 1919
A. J. Holmquist, Iowa	Mar., 1919
Emil Hahum, Minn.	Mar., 1919
G. N. Follmar, Neb.	Mar., 1919
C. J. Vonblad, Penn.	Mar., 1919
F. Weber, Tasmania	Mar., 1919
Wyper Bros., Queens	Mar., 1919
A. Rogers, N. Y.	Mar., 1919
P. W. Fossitt, Me.	Mar., 1919
C. Hubman, Colo.	Mar., 1919
Onondaga Forge Co., N. Y.	Mar., 1919
A. F. Bowman, Ohio	Mar., 1919
C. Williams, W. Australia	Mar., 1919
J. P. Mackin, N. D.	Mar., 1919
E. Raets, Kansas	Mar., 1919
A. Burke, N. J.	Mar., 1919
Fanalow Brothers, S. D.	Feb., 1919
John Meyn, Illinois	Feb., 1919
D. Fraser, N. Zealand	Feb., 1919
C. T. Haskins, N. Y.	Feb., 1919
N. E. Koch, Cal.	Feb., 1919
C. W. M. Burroughs, N. J.	Feb., 1919
L. Arstner, Ohio	Feb., 1919
R. Taylor, N. Zealand	Feb., 1919
E. Strode, Ore.	Feb., 1919
Lehman Bros., Ill.	Feb., 1919
W. J. Andrews, Ark.	Feb., 1919
O. N. Benninger, Penn.	Feb., 1919
C. L. Crossen, Ill.	Feb., 1919
H. G. Schasta, South Dakota	Jan., 1919
W. Harnsape, S. Africa	Jan., 1919
J. J. Bergerheim, Cal.	Jan., 1919
L. A. Telking, Kansas	Jan., 1919
W. S. Wagner, Texas	Jan., 1919
A. Mackenzie, W. Australia	Jan., 1919
I. E. Saunders, Mass.	Dec., 1918
M. Mack, N. Y.	Dec., 1918
R. F. Randall, Mass.	Dec., 1918
L. Chartier, Conn.	Dec., 1918
P. E. Dahlquist, Calif.	Dec., 1918
C. Pilnaeck, N. Y.	Dec., 1918
E. B. Storey, Miss.	Dec., 1918
J. Jensen, Wisc.	Dec., 1918
W. B. Jones, Indiana	Dec., 1918
E. E. Roberts, Indiana	Dec., 1918
M. Gus Thomas, Hawaii	Dec., 1918
J. L. Glaser, Texas	Dec., 1918
E. L. Lain, N. Y.	Dec., 1918
Peter Miller, Neb.	Dec., 1918
F. Cluska, Md.	Dec., 1918
M. Beck, New York	Dec., 1918
B. R. Merritt, Queens	Dec., 1918
Brown & Scully, N. S. Wales	Dec., 1918
A. Horstad, Minn.	Dec., 1918
E. P. Howes, Mass.	Dec., 1918
C. N. Robinson, Vt.	Dec., 1918
F. Trelegan, N. J.	Dec., 1918
G. F. Vincent, N. Y.	Dec., 1918
J. R. Conrad, Kansas	Dec., 1918
A. O. Ghouz, Mass.	Dec., 1918
A. A. Murray, Texas	Dec., 1918
C. W. Brake, Mich.	Dec., 1918
J. Dubendorf, Penna.	Dec., 1918
G. F. Langhlin, Ill.	Dec., 1918
L. M. Platt, Penn.	Dec., 1918
F. Boeckman, Ill.	Dec., 1918
W. H. Habermehl, Iowa	Dec., 1918
E. T. Marshall, Wisc.	Dec., 1918
F. Hoopengardner, Md.	Dec., 1918
Hebrew Tech. Inst., N. Y.	Dec., 1918
G. E. Winchester, Calif.	Dec., 1918
F. T. Grisham, Ark.	Dec., 1918
J. Gray, Scotland	Nov., 1918
Sam Winn, Mo.	Nov., 1918
A. Silverthorne, Ind.	Nov., 1918
E. M. Brown, Ill.	Nov., 1918
H. C. Smales, Pa.	Nov., 1918
L. B. Heath, Calif.	Nov., 1918
T. W. Shearer, Colo.	Nov., 1918
H. Miller, N. D.	Nov., 1918
A. B. Dwinell, Colo.	Nov., 1918
H. J. Hanson, N. D.	Nov., 1918
W. J. Morris, Queens Aust.	Nov., 1918
W. Tait, New Zealand	Nov., 1918
A. Larsen, New Zealand	Nov., 1918
R. E. Russell & Son, Penn.	Nov., 1918
H. Schaffer, South Dakota	Nov., 1918
D. MacDonald, N. S. Wales	Nov., 1918
C. A. Ritchie, Scotland	Nov., 1918
T. E. Sanders, England	Nov., 1918
G. E. Hardcastle, N. Y.	Nov., 1918
C. Eliehe, Iowa	Nov., 1918
J. L. Peffer, Penn.	Nov., 1918
W. H. Houghton, Penn.	Nov., 1918
F. R. Tomlinson, Kansas	Nov., 1918
F. A. Rhea, Ill.	Nov., 1918
C. A. Bouvoulour, Ill.	Nov., 1918
H. V. Ruehl, Ala.	Nov., 1918
T. L. Donahue, S. D.	Oct., 1918
Baum Brothers, Calif.	Oct., 1918
E. H. Gilgan, N. Y.	Oct., 1918
C. W. Seiden, Pa.	Oct., 1918
A. Ruth, Ill.	Oct., 1918
J. A. Hallberg, Neb.	Oct., 1918
W. Hartnell, Neb.	Oct., 1918
N. Dewes, Neb.	Oct., 1918
J. W. G. Hampel, Iowa	Oct., 1918
P. Toohill, Iowa	Oct., 1918
P. P. Vondenbasch, Ill.	Oct., 1918



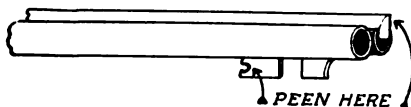
The Machine and Tool Smith

Steel Over Two Thousand Years Old

At recent meeting of the Faraday Society, Sir Robert A. Hadfield, the president, in speaking on the subject of "The Hardening of Metals", showed a specimen of steel which, says *The English Mechanic*, he offered as probably the first to be exhibited in modern times of an ancient piece of high carbon steel which had been hardened by quenching. The analysis was as follows:

	Per cent.
Carbon	0.700
Silica	0.040
Sulphur	0.008
Phosphorus	0.020
Manganese	0.020
Iron	99.500

In describing it Mr. Hadfield said it was possible to obtain a fracture of the specimen, which weighed about 8 oz., was 3 in. in length, 2½ in. in breadth, ½ in. in thickness. This showed fine crystalline, but rather brittle structure. After removing the scale the Brinell ball hardness number was found to be 146. On sawing the specimen in two



A GUN REPAIR HINT

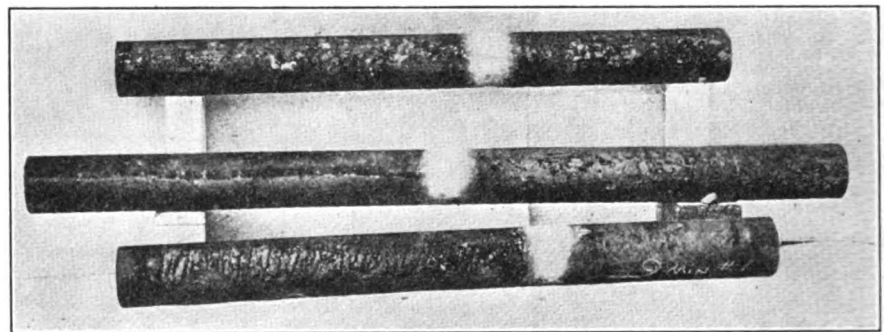
there was found to be a quite fair proportion of the original metal still unoxidised. I received this specimen a few months ago from the superintendent of archaeology in Western India, Mr. Bhandarkar.

One of the special points is that, notwithstanding the large number of specimens of ancient iron and supposed steel I have examined the last few years, none of them have contained sufficient carbon to be termed steel in our modern-time meaning.

This specimen, as will be seen from the above analysis, contains as much as 0.70 per cent. carbon, which indicates that it can be readily hardened by heating and quenching in water. In other words, this material has been in its present condition for probably more than 2,000 years, and now, after being heated and quenched, hardens exactly as if it had been made only yesterday, thus showing that in this long interval, and beyond surface oxidation, this specimen has undergone no secular change of structure or alteration in the well-known capacity of an alloy of iron with carbon to become suddenly possessed of glass-scratching hardness after being heated and quenched in water or other cooling medium.

The photomicrograph of the material in the original condition shows that though variable in structure, and ranging in carbon from about

the breech. When a gun gets in this condition, the owner generally tries to sell it at a low price. But as the gun is shaky, no one wants it at any price, and what was once his favorite gun, is cast aside as useless. Now a loose gun can be made as tight as new by penning up the place where it is worn as shown by the two arrow points in the engraving. To do this, place the lug on a solid piece of iron and go around the half-hole with a small cross pene hammer, striking light blows, then turn the gun over and do the same on the other side. This will close the hole and take up the worn part. The gun should be put together every once in a while during the penning operation to see that it doesn't get too tight. If it does, it will have to be filed out. It is best to go slow and save this trouble. Sometimes it is only necessary to pene the bottom lug that fits next to the pin. These lugs are soft



DEFECTIVE PAPER CORES WELDED WITH THE OXY-ACTYLENE FLAME

0.30 to 0.75 per cent., this is of pearlitic type, existing in both lamellar and sorbitic form. The crystallisation varies from fine to coarse. In places the structure is blued, as a result probably of mechanical work. There are seams of slag in certain portions, but apart from these the material appears to be of similar type to ordinary modern carbon steel. After quenching from 850 deg. C. in water the steel readily scratches glass, and under the microscope reveals the expected martensitic structure.

Mr. Bhandarkar assures me there is not the slightest doubt about the antiquity of this specimen from the bars found beneath the stone pillar of Heliiodorus at Besnagar, India. It was found at the bottom of the pillar, dating back to about 125 B. C.

A Gun Repair Hint

BERT HILLYER

Shot-guns, from the heavy recoil and hard usage, soon become loose at

and the job only takes about ten minutes and the owner will be delighted to find that his gun is tight and safe to shoot again. The writer (who is a gun crank and only owns four of them) has repaired several for his friends and one for himself in the manner described.

Welding Defective Cores in Paper Mill

The St. Croix Paper Company of Woodland, Maine, were throwing all broken and defective paper cores on the scrap pile. Much of this material was sold as junk at the best prevailing market prices and many carloads of broken and defective cores had been disposed of in this manner before it was discovered that all of them could have been made as good as new by employing oxy-acetylene welding.

By using the oxy-acetylene process of welding, broken cores similar to those shown in the illustration are now repaired in nine minutes. No

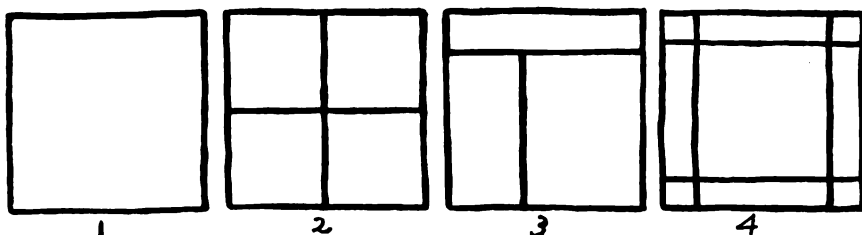


FIG.—1, 2, 3 AND 4 ILLUSTRATING DESIGN

filling material is used, as a method has been found for handling the welding operation so that sufficient strength can be obtained with the material flowing into the weld from the pipe itself. Occasionally, however, a small quantity of filler rod has to be added to insure a joint that will be as strong as the rest of the core itself.

The two sections of pipe are prepared by simply cutting off in a machine with the regular cutting-off tool. The ends of the pipe are not beveled, as the extra metal is needed where filling rod is not added.

The cores are steel tubes three inches in diameter and average about fifty inches in length. During the welding operation, they are slipped over an iron arbor of the same diameter as the shaft on which the roll is designed to run, to insure perfect alignment with the longitudinal center.

As these cores accumulate very rapidly in the enormous production of the St. Croix Paper Company it is stated that enough material, heretofore scrapped, is now on hand to furnish several year's supply of new cores without making it necessary to draw on any new material at all.

Tests of welded paper cores indicate that the reclamation process does not affect the original strength in the least—the welded portions stand the punishment incident to rough handling during continual shipping, although frequently the original metal in the tube is broken.

Former methods at repairing these damaged cores were very unsatisfactory. One method was to make a hammered weld in a blacksmith forge, first preparing the ends of the rolls by beveling one piece on the inside and the other on the outside so that they fit together snugly, making what was practically a lap weld.

This method necessitated the workman continually standing over a very hot fire, resulting in some cases in the loss of the services of good workmen because they were required to do that kind of work.

It is estimated that 250 lbs. of coal were used daily in maintaining the fire for the blacksmith's welding operation, and only a small number of cores could be repaired in a day as compared with the more economical method of welding by the oxy-acetylene process.

In view of the low cost of the oxy-acetylene welding equipment required and the greater speed with which the repair of broken cores is accomplished, the saving affected by the St. Croix Paper Company is considerable.

Designing Ornamental Iron Work

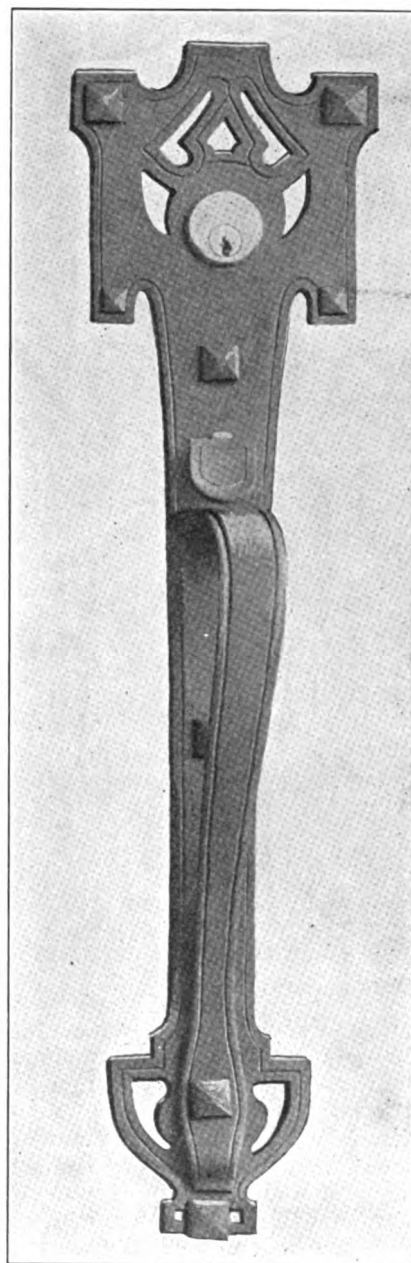
THOMAS GOOGEY

In making designs to be worked out in iron, principles must be followed in the same manner as designing for any other of the industrial arts. This subject of design based on principles is well known to the student of art and has survived for ages in architecture and history. No matter what one is designing the article when finished should be of some service, possessing beauty of outline and perhaps color. It is a well known fact in first glancing at an object, let it be a building, a piece of furniture or anything of that sort, it appears to us a mass. In other words we view the whole of it, taking in the boundary lines, and later the detail. This matter of looking at an object as a mass is something for the designer of iron to think about when he begins to lay out his design. In the first place the boundary lines must be of good proportion, unless these lines are fixed by construction. In that case the space enclosed may be divided to get a harmonious arrangement of masses. In designing a rectangle, ratios have always been considered. As an example good ratios are: 1 to 3, 3 to 4, 3 to 5 and 5 to 8, or something difficult for the eye to analyze. Objects that are nearly square are not as good. A good rule to use when figuring ratios is that one half of the end will go into the side three times.

At Fig. 1 is shown a square

rectangle which in itself it would not be considered a poor design. We cannot criticize it. At Fig 2 we have introduced lines dividing the surface into four equal parts, as a design it would now be considered poor owing to the fact that the rectangles are equal in size which produces monotony. At Fig. 3 and 4 we have placed the lines so as to divide the surface into unequal spaces which gives variety, therefore the rectangle is interesting and has lost the feeling of monotony. In the designing of iron variety is one of the principles we must seek and not monotony.

We have said that rectangles with unequal sides and with the proper



A WELL DESIGNED ESCUTCHEON
PLATE



ratios were interesting, also that square rectangles were interesting when subdivided into unequal spaces.

In designing an escutcheon plate for a door latch we will try to show where some of these rules have been put into practice. At Fig. 5 is shown an illustration of a complete door latch made for a plaster dwelling house. At Fig. 6 is shown a line

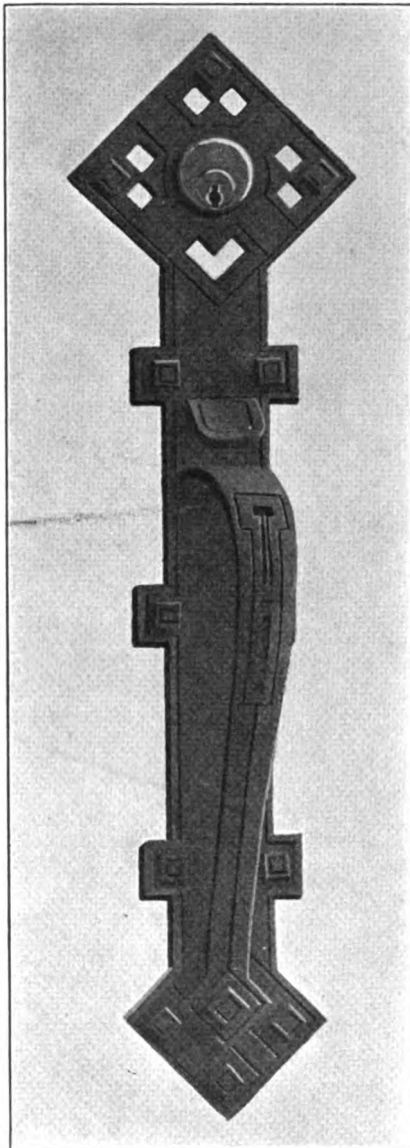


FIG. 5.—ANOTHER ESCUTCHEON PLATE

drawing of the plate. Notice that the rectangles at the top and bottom are of unequal size, thereby distinguishing one end from the other and adding variety to the design. Notice also that the rectangles are turned diagonally to the lines of the long center part thus contrasting with it. The dotted lines projecting from the plate show that the design is made up of unequal spacings or measures thus giving variety to the whole

design. The open places and the chasing on the surface of plate, also add to its interest. The nails that fasten the plate are forged with square heads to keep them in harmony with the balance of the plate, and are also chased. If a line were drawn through the vertical center of the plate one side would be found to be a duplicate of the other. Notice at Fig. 7 the leaf end and the vase where the same principle of unequal spacing has been carried out.

At Fig. 8 is shown a reproduction of some ancient English iron work. Notice that the measures or spacings are of unequal size, giving them variety of outline. They are also highly conventionalized. The beautiful strap hangers shown are made so that the strap part is to be on the outside of the door and allowing the door to swing in. Perhaps these patterns are traceable directly to the simple tools used. The old craftsman knew that certain lines and forms were readily produced by certain tools, and through the use of these many of his forms were evolved.

One can readily see and understand that it requires some thought and study to invent designs as shown in this picture. How very interesting and lasting to one are these pieces which have survived for hundreds of years. Compare them with some of the so-called modern realistic iron work.

It is a well known fact that the most interesting work in design was achieved when workmen were designers. Conditions have changed, workmen are no longer designers under the modern factory methods. The studio trained artist and the shop trained man do not understand one another. The artist has a fine feeling for good taste, but a poor understanding of the means in executing the work, while the workman does not understand design. Therefore, it seems as though the shop trained man who is working in any of the industrial arts and who wants to produce good work should give some time to the study of the underlying principle of design.

Tying Yourself Up Not to Re-engage in a Certain Business

The following, an extract from a letter written by a Massachusetts reader, will I am sure, interest everybody:

"I am about to sell my business,

a business which I have built up in the last ten years and which is valuable and making a good, regular profit. My health has broken down, and it is my intention to rest for

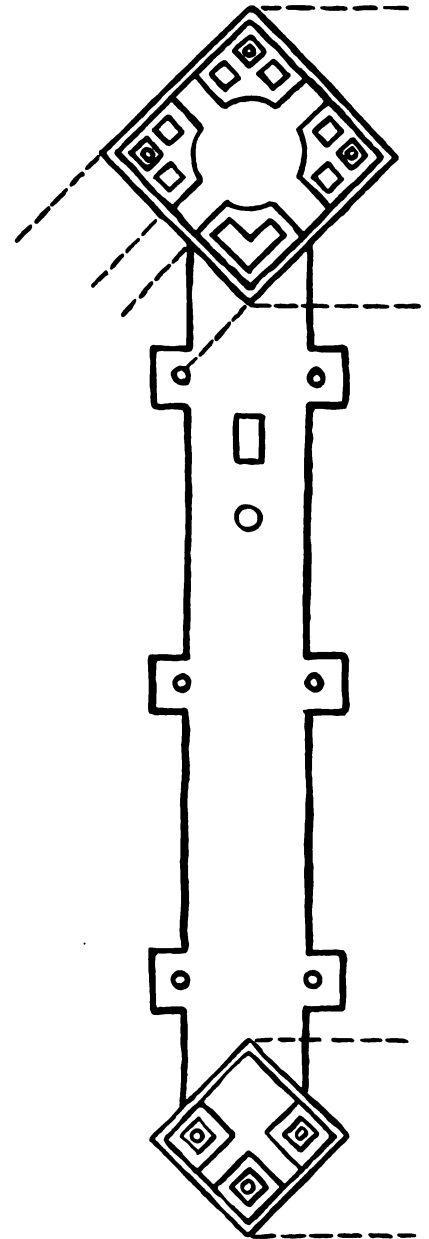


FIG. 6.—THE LINE DRAWING FOR THE ESCUTCHEON PLATE

about a year and then re-engage in the same business in the same city. My buyer has asked me to sign an agreement not to go back in the same line of business, but I have put him off until I could obtain your advice. Have I not heard that such agreements are illegal? I do not wish to tie myself up so that I can't go into business again, and as this is the business I have always followed, I should be out if I agreed not to go into that. Please advise me how far a man ought to go in making an

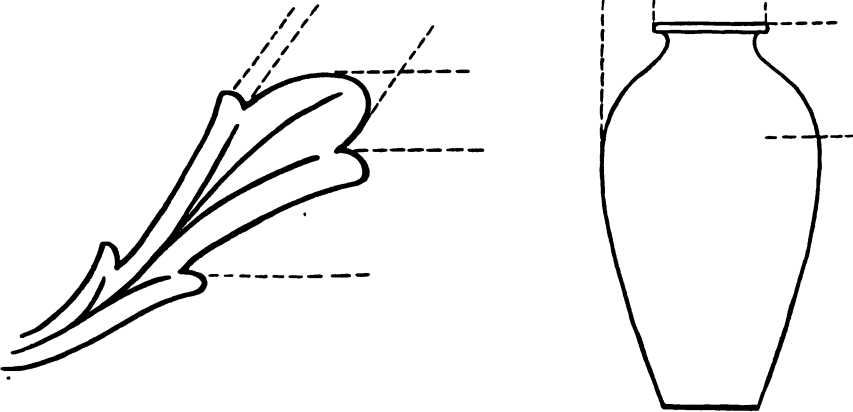


FIG. 7.—ILLUSTRATING PRINCIPLES OF DESIGN

agreement not to re-engage in business."

This kind of an agreement which this correspondent speaks of, viz., an agreement by the seller of a business not to go back into that business, is considered by the law an agreement in restraint of trade, and must be framed within certain limits, or it will not be enforced. The courts do not believe in restraint of trade, but they will enforce an agreement which protects the buyer of a business from the former owner's competition, if it doesn't go too far. Under the old English law, which is the foundation of our law, you could not tie up a man to stay out of business. That rule, however, has been relaxed, and you can do it today, anywhere in the United States, within certain limitations.

Those limitations are that the seller must not agree without limit as to time to remain out of his former business forever, nor must he agree without limit as to territory, to remain out of his former business *everywhere*, even for only a limited time. For instance, if a hardware dealer sells his store and agrees never to go into the hardware business anywhere, the agreement is void. If he agrees not to go into the hardware business anywhere for a year, the agreement is void. But if he agrees never to go in again in the town where his former business was located, the agreement will usually be held to be good. The courts, however, look with most favor upon agreements that keep a man out of business in a given territory for a limited time, thus prescribing a limit both as to time and territory. The purpose, of course, is to give the buyer time to establish a personal connection between the customers of the house and himself.

In most States today there is no iron-clad rule about it. When one

of these agreements gets into court, the courts listen to all the facts and then ask themselves this question: "Here is a man who has bought a business, relying upon the seller's promise that he would not immediately start in to compete with him. What sort of protection will be ade-

quate for him?" And then they will supply that protection if they can; in other words, if the agreement the parties have entered into is not unreasonable, it will be upheld. Particularly because it is a low thing for the seller of a business to sell on an express promise not to at once compete with his buyer, and then, with the latter's money in his hand, plead that his agreement was invalid.

I can best give point to this explanation by citing a few of the restrictive agreements which have been upheld by the courts: An agreement on the sale of a magazine not to publish a similar one; an agreement on the sale of a law practice extending throughout England, not at practice law in England for twenty years; an agreement not to engage for ten years in business as a soap manufacturer within forty miles of Lockport, N. Y.; an agreement not to engage in business as a banker in a certain place for ten years; an

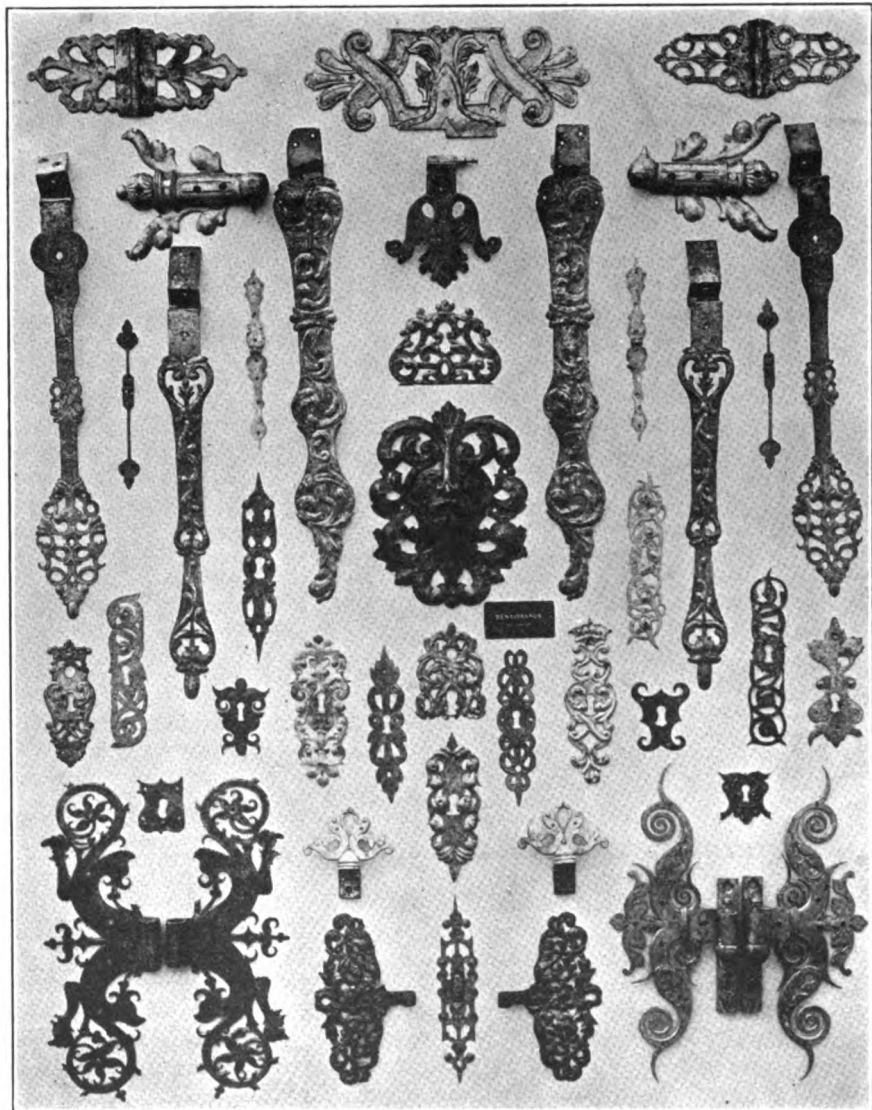


FIG. 8.—OLD ENGLISH METAL WORK ILLUSTRATING GOOD DESIGN



agreement not to carry on the tobacco business in Albany or Schenectady (N. Y.) and surrounding towns; an agreement not to run wagons over a butcher route which had been sold; an agreement by the seller of a bakery never to solicit trade from the old customers; an agreement by the clerk for a firm of custom house brokers not to take a similar position within fifty miles of

not to practice dentistry in any part of a district two hundred miles in diameter; an agreement not to carry on a perfumery business within six hundred miles of London; not to become a coal dealer *anywhere* for nine months; not to make yeast powder anywhere for eight years; not to re-engage in a certain manufacturing business anywhere within a thousand miles of the seller's for-

line of needed protection? If it does, as it did in all of the above cases, it is set aside, and the seller of the business is as free as if he never made it.

I fear I cannot give this correspondent anything like exact advice, for I have no knowledge of the facts of his case. Naturally, one should never tie himself up any longer than he can help. I think that the agreement in this Massachusetts case should be to remain out of the particular business in the given town for one year. There is no doubt that such an agreement would be valid and binding.

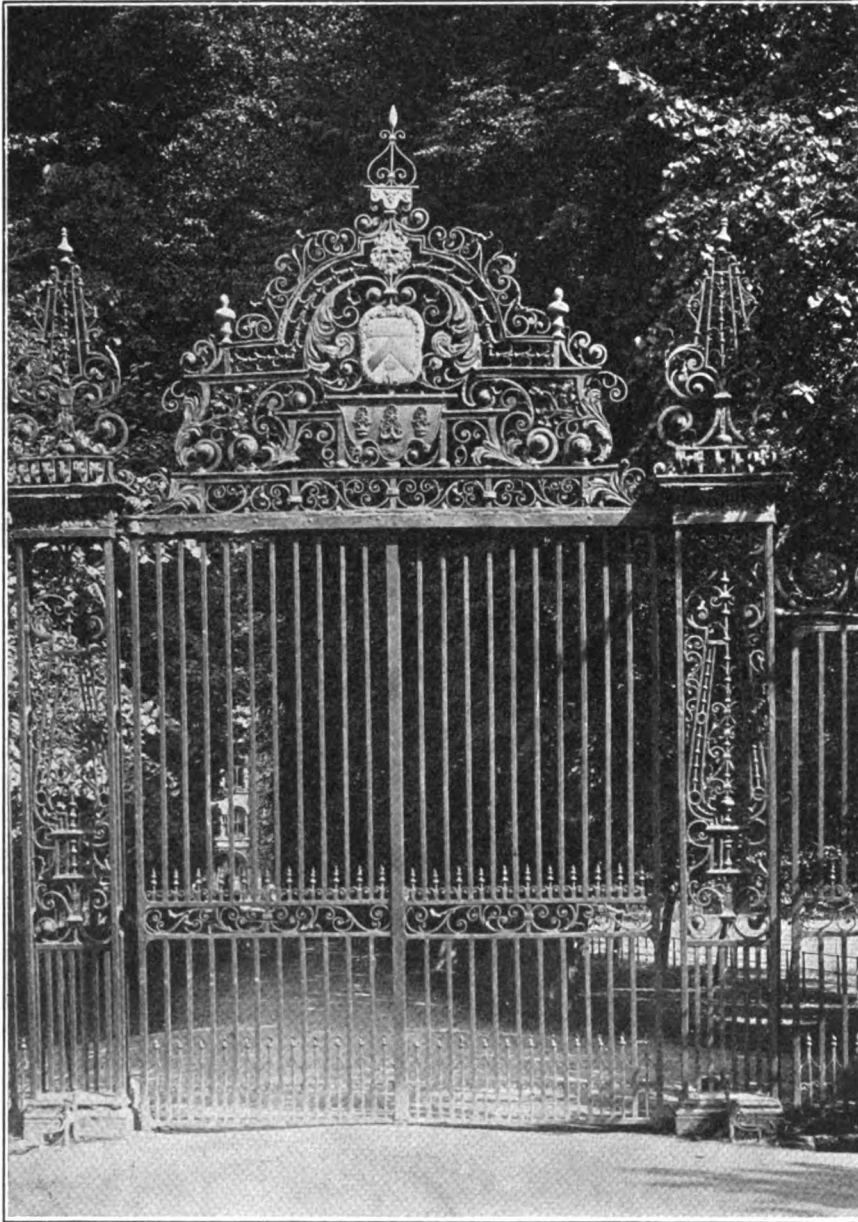
(Copyright by Elton J. Buckley.)

Two Trinity College Gates at Cambridge University

JOHN Y. DUNLOP.

The most essential English development of smithing is to be seen in the many examples of tomb railing grilles and entrance gates which are formed of plain and massive vertical bars of which our cast iron garden railings are the descendants. While in foreign countries they were endeavoring to retain beauty laced designs for their grilles and gateways and to overcome the weakness of these by elaborate defensive crestings, we were going straight to the point by introducing our designs with vertical rails constructed of horizontal bars. Beauty was made subservient to practical utility in a way that once brought such designs into almost universal use. So that no monument or building of any pretension was left unguarded by them down to the close of the Tudor dynasty. Sketches of these buildings published before the wholesale removal of those ancient railings and gateways during the first half of the nineteenth century, present vistas of cage-like bars and gateways which seen in perspective completely conceal the entrance they protect. The date of the introduction of these examples are uncertain, but none now exist which are positively older than the fourteenth century.

Some very old iron work is that to be found about the many English Cathedrals and the College Gateways in Cambridge. In these Colleges are to be seen rare examples of early smith work, and I understand that some of the tomb railings present the earliest instance of the introduction of crests of the founders surmounting the standards, afterwards a very unusual feature. The elaborate work put into those en-



THE ENTRANCE GATES AT TRINITY COLLEGE CAMBRIDGE UNIVERSITY

the same city for twelve months after he gave the position up.

In all these cases and in many more, the courts held that the agreement only afforded reasonable protection to the person involved.

Here are some agreements which the courts have held invalid because they involved unreasonable and unnecessary protection: An agreement

mer town; an agreement by an employee not to engage in similar business, after leaving his employer, within three years in any of sixteen States; an agreement by an oil dealer not to go back in that business anywhere in Indiana, the city of Indianapolis excepted.

Here the standard was the same—does the agreement go beyond the



trance gateways was done so that they might be more decorative and particularly massive. But in the Cloister gates this work was adopted from its useful form, and indeed considering that the applications at the smith's disposal were very limited it is not easy to imagine any more difficult and expensive task than the production of the Cloister gates shown.

A very little study shows that this type of gate was not selected because it was admired beyond others. But solely on account of it offering much better protections so that the bars would not be easily wrenched asunder or bent apart and this is the sole reason for the designs of the Cloister gates in the half tone illustrations having only short up-right bars compared with the entrance gate.

In the Cloister gates the one is built with a double gateway, while the other has a simple form of small gate. Each of these designs seem to have been the work of the one smith, for although somewhat different in form they are treated in a very similar way. Practically speaking, they are forged out of material of the same thickness. That is, the panel filling and the scrolls are of a uniform size from the front to the back of the gate, and it is only at the junction with the leaves has any attempt been made at drawing the metal out for artistic reasons.

The functions of the scrolls work are particularly fine as every line has an unbroken rim. This is due to the joins of the scrolls and the main iron work being in many cases rivetted together instead of using collars as is found in many examples of old work.

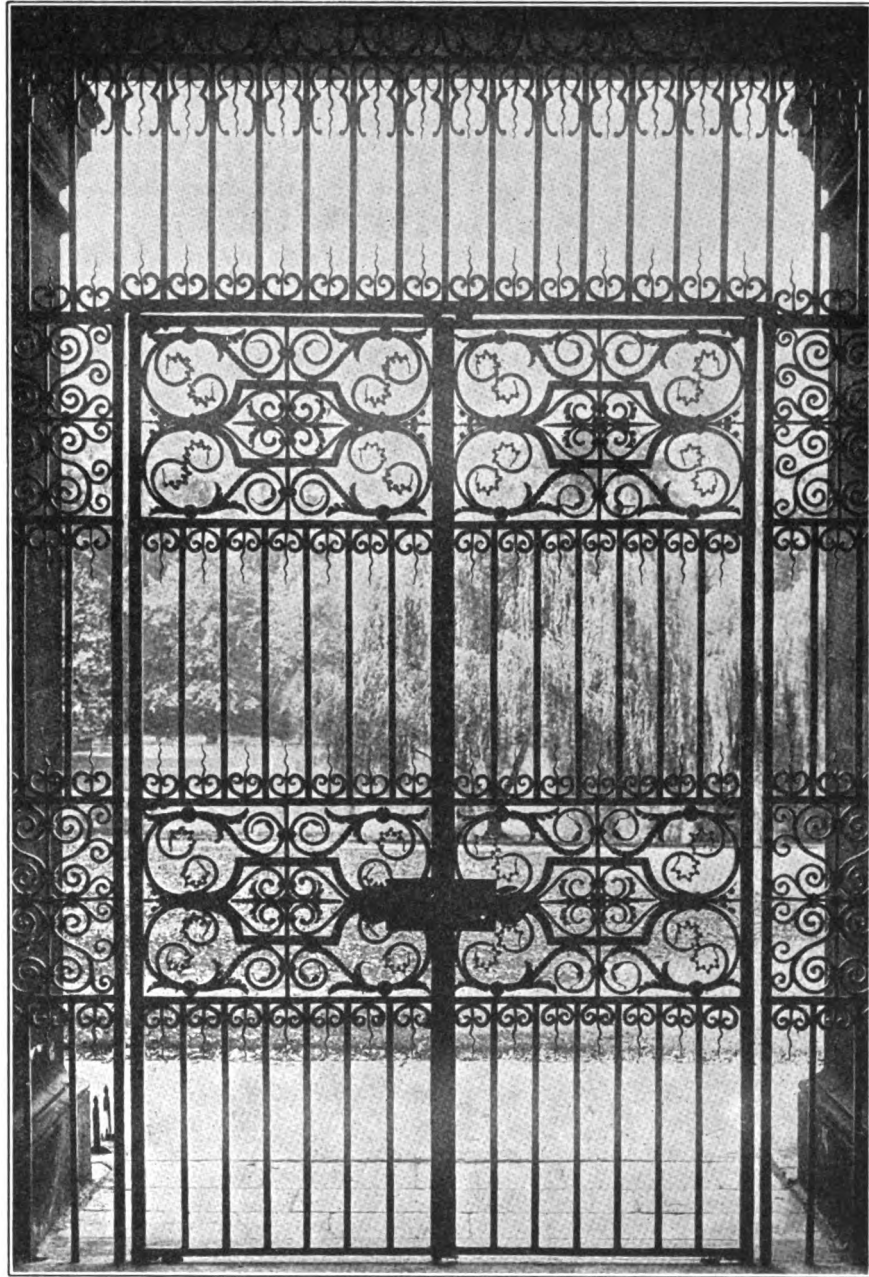
The second gate which has folding doors is built with a fixed frame at each side. The division of the horizontal rails are much the same as in the first design, but with regards to the scroll work it is a more handsome and elegant specimen of cloister gate. It is a marvel of wrought iron scroll work and its beautiful and graceful outlines makes it admired by all.

There is one particular want about these two last gates when compared with the entrance gate of this same college and that is the lack of beautiful foliage, which at all times appears to me as the crowning feature or the master stroke of the mediæval craftsman. In all those gateways the early smith depended chiefly on the degree of permanence which was given to the overhead

part of the design, and generally we find that like parts and spaces between are rarely the same size as the metal parts in both the centre overhead part and the side fixed panels. The stem passing through the spiral centre is a very important part of the smith work.

The centre is certainly the chief

would be forged to the full size design of the gate drawn out by the smith. These would all be placed loosely together on the drawing board and after a few set and corrections on the collective form they would be rivetted together. Then would come the preparation of the bands of straight and circle space



CLOISTER GATE AT TRINITY COLLEGE CAMBRIDGE UNIVERSITY

pause point of the spiral which in the side panels are linked together with collars. The other pause points or where the scrolls touch the side ornament are rivetted. Overhead there is the main horizontal lines which divide the ornamental panel in bands.

In every case these bands and main arteries of the scrolled work

filling each part, which would be forged separately, then fixed in position. The smith would now proceed with the cutting and shaping of the beautiful leaves which are formed on both sides of the gate. Where these appear as on the edge of the metal design they would be forged in one piece, but in all other they have evidently been made separately



and fixed together. This same arrangement exists in the building of the college coat-of-arms which is in two pieces.

I have given this example of a gateway because it is a good example of spontaneous metal work, which has been the results of manipulation which, however, can only come when the craftsman is well trained in keeping the essential directions of lines.



Benton's Recipe Book

The faker is again heard from—this time it's the chap who sells a "patent nickel-silvering solution" to nickel-plate anything from a brass gas fixture to the metal parts of a buggy. Blacksmiths, harness-makers and carriage repair men have "fallen" for this "fake" solution for years. It's nothing new, tho' the faker will tell you it is. Its not a real "plate" at all, tho' the man who sells it to you will say almost anything about it. And he will demonstrate it, too. He'll take a piece of brass, rub it with his "patent nickel plater" and lo! and behold! the brass has turned "to a whiteness, competing with the finest silver plate." And for this the faker will ask anywhere from ten cents to a dollar a bottle, depending upon his ability as a talker and your stupidity as a buyer. And now the truth about the

stuff the faker sells. It is simply mercury dissolved in nitric acid and the coating of nickel or silver that it "puts on" will not last a day. When this chap calls on you, whistle for the dog and keep your hand on your wallet.

A good frosting for glass that imitates ground glass quite well is made up as follows: Sandarac, 18 parts; mastic, 4 parts; benol, 80 parts, and ether, 200 parts. Clean glass thoroughly before applying and then apply quickly.

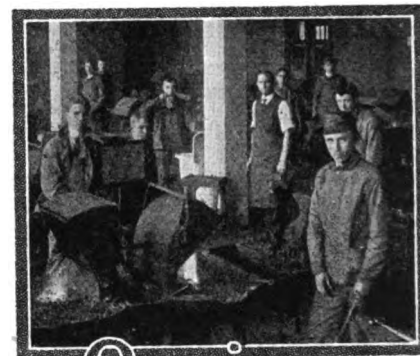
To finish wooden handles, gun stocks and similar articles of wood with a high finish and at the same time to preserve them, soak the articles in linseed oil for a week or so and then give them an occasional rubbing at intervals of a day or two until the desired polish is obtained. This preserves the wood and gives a natural finish that many consider greatly superior to the usual artificial finishes and colorings.

Another crack filler for cast iron is made of Japan dryer, two and one-half ounces, finely ground dry and white lead, one and one-half ounces. These are carefully mixed and then added to a quart of finishing Japan, when enough rotten stone is added to make a thick paste.

Hand saws greased with kerosene seems to be an old stunt used by carpenters and woodworkers when a saw runs hard, but if there happens to be any rust on the saw the kerosene will cause the wood to be stained. Here is a stunt suggested by an old woodworker: Oil the saw liberally with kerosene and remove all rust from the blade, using if necessary, a piece of well-worn sandpaper to assist in the removal of the rust. Then wipe the blade dry and with a cake of paraffine rub the keep the saw in good shape, free from blade hard and then polish. An occasional application of the paraffine will rust and well lubricated.

How can you make your business grow if you do not study the trade papers and the papers of your trade for information? If each and every man since the time of Adam had depended upon himself for his ideas and his knowledge of how to do things, we would in all probability be still making stone hatchets and living on juicy roots. Just sit back

for a moment and consider the importance of a trade paper in the progress of the world, the country and the trade. Ask yourself how you would have known about the real happenings in the craft during the past few years if you had not read of them in your trade paper. How many smiths would now know about Oxy-acetylene welding and cutting if it had not been for "Our Journal"? Consider these things seriously and your conclusions cannot be in doubt. Then tell your neighbor.

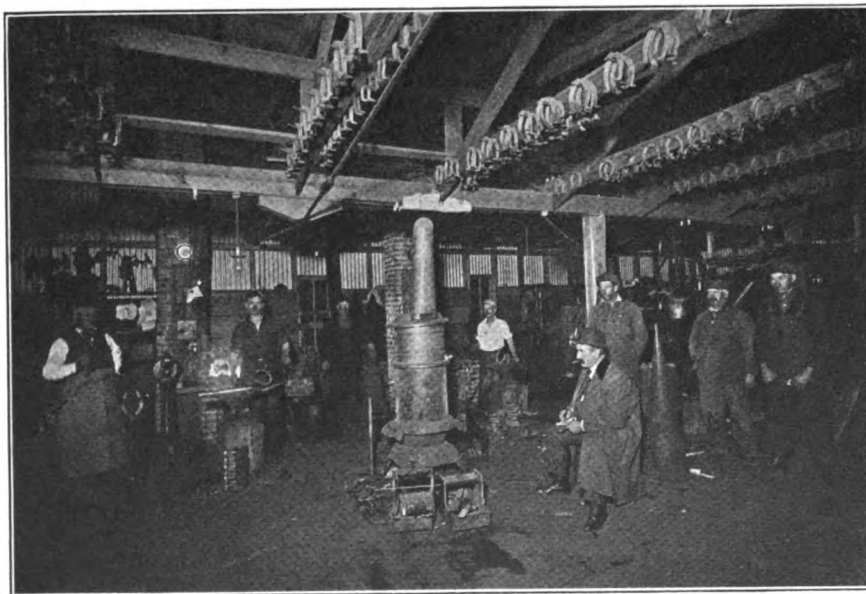


Queries— Answers— Notes

A Family of Six Blacksmiths—We notice in your October issue a small item about some young blacksmiths and there being six blacksmiths in the family. My father has eight boys in his family and all of them do some work in the shop; the youngest being six years of age, and the oldest twenty-five. The oldest boy is a first class blacksmith and the one next oldest a first class horse-shoer, while the others make up the shop crew, as painter, helper, wood worker and so on. The initials of this family are as follows: T. F.—W. H.—O.—J. F.—Geo. W.—T. H.—J. H.—J. H., jr. and W. G. W. H. CROWDER, Georgia.

Holding the Vicious Horse—Brother S. S. Yeager, Indiana: take a good stout rope, say 14 feet long, make a slip noose in one end and place a short stick on the horse's tail just below the bow, double tail up over stick and place the slip noose around the tail above the stick. Now place a stout strap through a ring and then fasten around the fetlock. Run the rope through the ring and then pull on long end of rope. It may take two men to get his foot at first, but I have shod horses this way that would lay down and kick and do everything they could think of that was mean. Now if the horse is bad about clinching, take rope from tail, tie one end to collar, run the other end through collar, draw the foot ahead and tie in a bow knot. If you want to let the horse have his foot quickly, you can untie by pulling the end of rope. This is an old stunt in these parts, and I supposed everybody knew how to work it. It requires one or two men to hold the rope while the shoe is being put on.
C. A. ELLIOTT, Michigan.

The Reason for Iron Weld Failures—In using welding compounds such as Cherry heat, Climax and others that carry a percentage of soft steel, drillings or lathe turnings, a mistake is made when welding



THE GENERAL SHOP OF MR. GUNARD GULLGREN OF IOWA



iron in raising your heat to where you overheat your compound.

These compounds are intended for general use and when welding steel, they are a success because when we are handling steel, we know that it will not stand the heat iron will Yet we forget to reckon with these compounds, and we undertake to weld the iron tire at a heat that the compound can not stand.

In consequence we get a bad job. If you will, in using these compounds, treat your iron welding the same as steel welding, you will have success. I have been in the smith business 25 years, and have always used borax or sand in the last two years. I have been using compounds and I have had failure upon failure with the different brands, that carry coit stee drillings or lathe turnings, and to tell you the truth (although to some it may show my ignorance), I have just recently discovered my mistake in using the compounds. If you have had failures in using these compounds in welding iron, just remember that it is not always the fault of your fire, but because you do not know how to use the compounds. JOHN DENBO, Illinois.

Shoeing the Over-reacher—In regard to shoeing an over-reaching horse I don't believe in the way that Mr. Wenke says he stopped that horse from over-reaching. There is not very much difference in an over-reaching horse and a forger. I don't believe in setting, the shoe back on a horse's hoof. I believe in shoeing a horse to his natural way, that is, to fit the shoe to the foot; to pare the foot level, square the foot up and fit the shoe to the foot. Make the horse stand on his feet square. Here is the way I shoe an over-reaching or a forger: Dress all off the toe on the front foot don't cut the heel on the front foot. Make the foot level, put a high shoe on in front with high heel calk, but no toe calk. On the hind foot place a heavier shoe with toe and calks. Keep the toe a little higher on the hind foot and the heel calks a little lower, just the least bit. If a horseshoer understands his trade he can keep the feet nice and square and stop a horse from over-reaching. I have shod lots of road horses and haven't had any trouble. In setting the shoe back on the hind foot and allowing the foot to extend over the shoe makes the foot look bad.

O. E. WADE, Ohio.

An Indiana Power Shop—I am sending a



THE BLACKSMITH AND SHOEING SHOP OF ELMER E. ROBERTS

picture of my shop which has just been completed. It is 44 by 60 with cement floor and two skylights. We do a general smithing business and wood working and are kept busy. We have a power equipment with a 4-horse-power Stover engine for power. Incidentally I sell Stover engines as a side line and I want to say that they fit in with blacksmithing very well. Our

span; resetting \$2.00 per span; Never Slips \$5.00 and \$6.00 per span. Hand made shoes, \$1.00 each. Tire setting, \$2.00 and \$2.50 a set. Sharpening plows 35 and 45c; pointing plows, \$1.00; polishing plows, \$1.00 to \$1.80. Wood work, new wagon pole, \$3.00; new buggy pole, \$3.50; new shaft, \$1.50 or \$3.25 a pair; cutting down wagon, \$12.00; Wagon boxes, \$16 to \$20.00.

My shop is 34 by 30, frame building. I have a shoeing floor 12 by 30 good old oak floor in it while the balance of shop is dirt floor. Shop is equipped with Fairbanks-Morse engine, disc sharpener, emery stand, tire shrinker, Royal H. blower and forge, a shoeing vise of my own make and full equipment of small tools that go to make up a general blacksmith and repair shop.

I do all kinds of work, such as general blacksmithing work, wood work, automobile work, tinning and, in fact, anything that comes along and I find that it is something that can keep a man busy all the time.

I enjoy reading *THE AMERICAN BLACKSMITH* and sure get lots of good out of it. I have been working at the trade for 1. years, and find that I can learn something new every day. I have been learning all these years and expect to learn something new as long as I follow the trade. I believe in honest work and honest prices. Not a cheap job and a high price, but good work and a price that is right and that will allow a man to live and pay his bills.

Some folks I know can't pay their bills and do lots of work, too. They don't stop to figure costs. I find a man has to know what his costs are before he can know what his selling price is going to be. There has to be a system to run a blacksmith shop as well as a department store. Brothers, know your costs, add your labor and profit to this and you have your selling price. Am glad to know that most smiths have learned to figure their costs.

A. H. MADDY, Iowa.

A Tire Tool—Here is a tool for putting on tires. The handle is about four feet long while the iron part is made of stock 1½ by ½ inch. The distance between the iron and wood should be about one-fourth wider than the tire that is to be put on. It can be adjusted by putting a piece of iron or wood under the iron part to get the proper distance for different tires. The end of the iron piece should be from 2½ to three inches from the end of the wood. The engraving shows how the tool is made. PHILO BUNDY, Indiana.

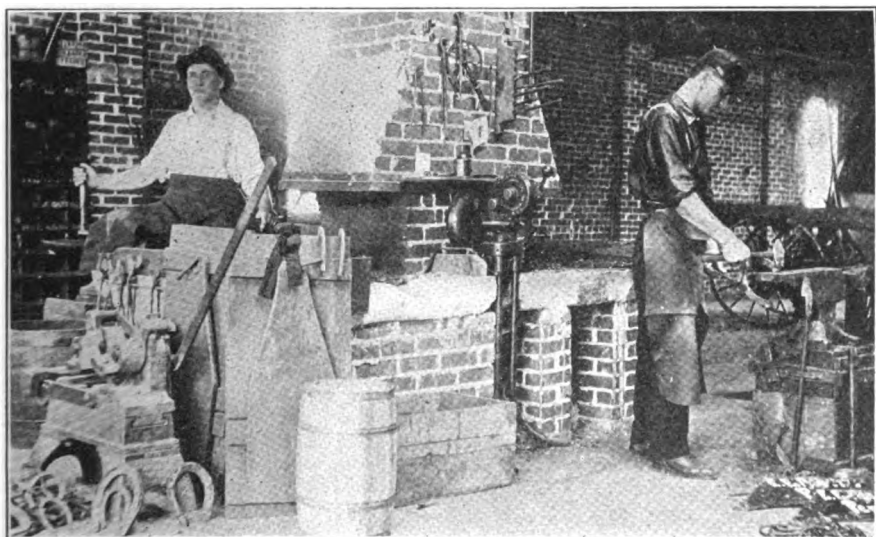


AN IOWA GENERAL SHOP RUN BY MR. A. H. MADDY

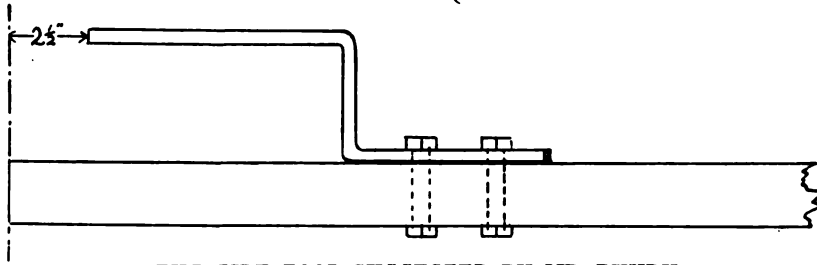
prices compare favorably with prices in other places.

ELMER E. ROBERTS, Indiana.

An Iowa General Shop—I am located out in the central part of good old Iowa, in a small town where my work is altogether farmer's custom, the best class of work going, I think. I have a good territory to draw from and get fair prices for my work. Some of the prices run as follows: Horse Shoeing, new shoes, common \$4.00 a



THE DOUBLE FORGE IN MR. E. E. ROBERTS INDIANA GENERAL SHOP



THE TIRE TOOL SUGGESTED BY MR. BUNDY

Wants Information on Thread Standards:—I am not as well informed upon threads and dies as I would like to be and want to know something about the various thread standards and the number of threads to the inch. I am referring particularly to the standard pipe thread used in the United States and I also would like a word of explanation regarding the Whitworth standard, the British, Acme, the International and the French standards.

In Reply:—The several thread standards used are known as the United States Standard, the Sharp V-Thread, the S. A. E. Standard (Society of Automobile Engineers), the A. S. M. E. Standard (American Society of Mechanical Engineers), the International Standard, the French Standard, the Whitworth Standard, and the British Association Standard.

The number of threads to the inch, of course, varies according to the diameter. For example: for threads $\frac{1}{4}$ inch in diameter, the number of threads will run 20 to the inch in the United States standard, the same in the V-thread and 28 to the inch in the S. A. E. Standard; while for material 1 inch in diameter, the United States Standard thread runs 8 to the inch, while the S. A. E. Standard runs 14 threads to the inch. The Whitworth Standard runs about the same number of threads per inch as the United States Standard, but the degree of the angle to which the threads are cut, is 60 degrees for the United States Standard, and 55 for the Whitworth. The differences in the various threads are perhaps best shown in the accompanying engravings. S.A.E., New York.

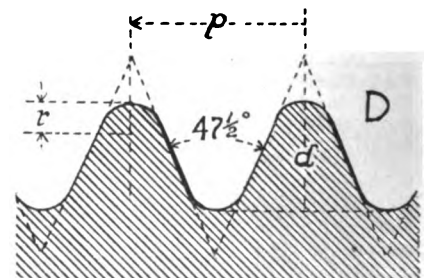
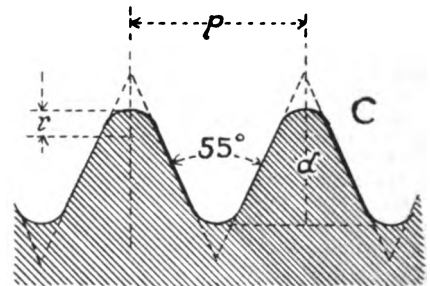
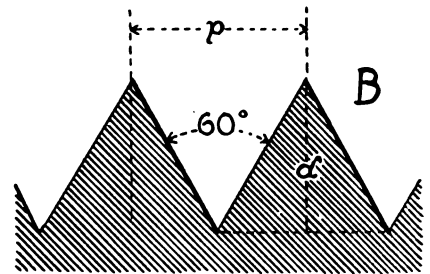
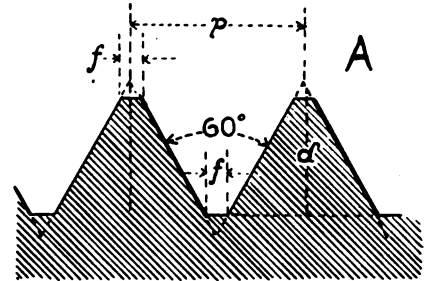
Plow-sharpening—Tire Setting—Welding—Horseshoeing:—The other day I stepped outside of my shop, looked it over and discovered that a sign advertising a certain cylinder oil that I never knew was there. The fact is, I had never thought before of going out and looking at my

shop. So yesterday I took a trip to a neighboring city, a few miles south, and paid a visit to the different shops there. I had to introduce myself and I explained that I hadn't been away from my business since I started, several years ago, but concluded to take a trip once just for luck.

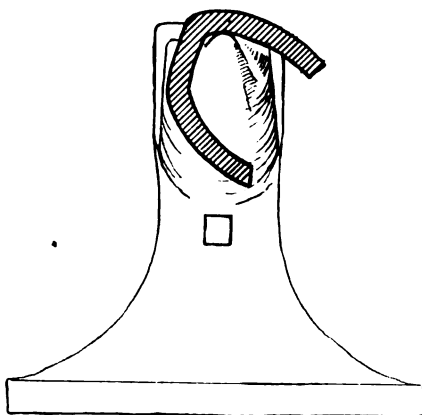
One shop I visited was owned by a smith who believed in up-to-date tools. His shop was of neat appearance and well filled with machinery. Among his tools were two that drew my attention. One was a Just Right plow sharpener of recent model. It was somewhat heavier than the first pattern put on the market. The smith explained to me an improvement he had made on the anvil of it. He had changed the bevel, making it a longer taper and making the thin end $\frac{3}{4}$ instead of $\frac{1}{4}$ which it originally was, thus making a better job at drawing the shares out. This struck me as a good idea to tell those that have one of these machines.

Another machine that I saw but which got my goat, was a hydraulic cold tire setter. He spent some time showing me how it worked. He shrunk a buggy tire; a 2-inch tire, a 3-inch tire, a thin buggy tire and a thin, wide tire. I am not going to express my opinion, as to my judgment of the cold setting process, but if you call on me and stay in six weeks you won't find a cold tire setter among my tools. I'd like to say more about this cold tire setting business, but what's the use. I've seen lots of tires set with the edge grip cold tire setters and had I done it, I would have been ashamed to take pay for it. Yet I have talked to several using them and they try to stuff me with the information that I don't know how to use the machine. Well, if that is the case, I hope that those who have been using them for three or four years, will hurry up and learn to use them. The tires the smith set to show me the working of his machine were as follows, as near as I can explain: The buggy

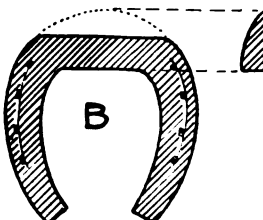
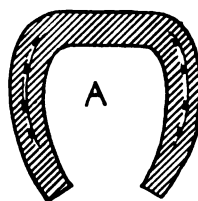
tire was crimped and shoved away from the felloe so that you could see under the tire. The wide tire was cupped and a crack appeared in the tire between where the clamps took hold. If you call that a successful way of setting tires, excuse me. I have noticed the cold setter problem discussed in "Our Journal," and have read every article, and since I have been thrown



THE STANDARD THREADS: A.—U. S.—S. A. E.—A. S. M. E.—INT. FRENCH. B.—SHARP V. C.—WHITWORTH. D. BRITISH ASSO.



MR. STONE TELLS HOW HE MAKES A ROLLING MOTION SHOE



in contact with the examples of this kind of setting, I don't blame the public for discussing it.

Another smith was pointing a plow with tool steel, laying the point on top only and allowing it to extend $\frac{1}{2}$ -inch over the plow point. The welding was done by placing two layers of common door screening (unpainted) between the pieces, using borax as a flux. I tried it and it's a great kink. The point was



clamped on with tongs in order to hold it in place to weld. Those who put points on in different ways can use this wire screening under the top lap of their points. Just cut the screen in a square or trim as you like, taking ordinary steel welding heats, as you must understand that the screening is made of soft steel.

Now, a word on shoeing. To make a rolling motion shoe for a No. 3 foot, take a No. 2 hind shoe of Phoenix or Perkins make or any shoe $\frac{1}{4}$ -inch thick. Get the toe of the shoe hot, place it on the horn of the anvil at the first nail hole and hammer the toe straight. Do the same with the other side and you will have a shoe as shown in the engraving. When in the shape as at A, draw to a thin edge to the dotted line as at B, leaving the inside edge as it is. Now you can make this level, a straight wedge shape, or a rounding break over as you like. For light shoeing take any hind shoe, of a light pattern. For horses that overreach this is a sure help and preventative, and you can make the break over as rolling or as abrupt as you deem it necessary to fit your case.

Now the reason I say to use hind shoes is for this reason:

If you drew out the front (the bevel) on a front shoe you would throw too much weight behind the center of the foot and it would unbalance the horse in some cases. When I have put the shoes on with the straight slant I follow with a well rounded front at the next shoeing. When you put them on a horse that forges, don't cut his heels down. You will find this is a good idea for this particular shoeing.

Now, another shoe, and I'll give you a rest. To remedy ankle knocking take any countersunk shoe, front or hind, and round it off from center to edge all round the shoe. After you have done this, shape up your holes and re-countersink them with a punch for that purpose. Now trim the foot low on the outside from heel to center of toe, put on the shoe, and you

motion with the foot in motion, so that by lowering the outside of the foot when it is brought to bear on the ground, it finds its bearing out of the striking line, and the foot in motion misses, goes clear the fraction of a hair. If he misses that little, he misses, doesn't he? The shoe is put on in a great many cases with the shoe following the foot, and without turning, the heel out on the outside. Now, to always have success, get the ankle that is not in motion out of the way, and you will have the right idea. I've seen horses shod every way imaginable, but this idea hits the spot and is a success more often than failure OLIVER STONE, Indiana.



The Automobile Repairman

To Pull Off Auto Wheel, take off the hub cap and then turn the axle nut about half way off. Now put several washers in the hub cap and turn the cap back on to hub. This will pull the wheel off.

I. N. BOWEN, Washington.

Add only distilled water or clean rain water to the storage battery cells when the electrolyte is low. Do not risk spoiling a battery by using anything else.

Don't tinker with any part of a car's mechanism unless you are quite sure you know something about it, or are at least sufficiently familiar with its workings to feel your way along. This applies particularly to such car devices as self-starters and lighting systems, coils, carburetors and the like.

A padlock suggestion: There are several places on a car where good padlocks are needed, namely on the tool box, on the tire holder, to lock the starting lever or the brake and other parts. Would a set of three or four good padlocks, all opening with one key, find a ready market among careful auto owners? Here's a suggestion for the auto smith.

When removing the spark plugs from the engine it is a good practice and one that stamps you as a careful workman, to put corks in the spark plug openings. This prevents dirt, soot, and grit entering the engine interior.

That rattle that is so annoying can usually be stopped with sensible use of soft leather. On door frames, between metal parts, under washers and bolt heads and in the innumerable other places that originate the "chatler" characterizing the "last year" model, the use of leather will help materially in quieting the tinniest tin can to the stillness of the exclusive limousine.

The Automobile Repair Shop

By "AUTO SMITH"

The Accounting End.

One of the greatest obstacles in the path of profit for the automobile repair smith is the case with which he can spend more time and use more material than is really justified by the price he gets for the finished repair job. Time enters into the cost of automobile repair work, or at least it should enter into the cost of automobile repair work much more and to a greater extent than it does in ordinary smith shop work. Where a smith has been in the habit of quoting a price on certain work, as in plow repairing and wagon and carriage repairing, he has considered the time element to a small degree, but as has been demonstrated, time and again, not to such a degree as is necessary and as has been shown by actual cost figures. The automobile repair smith, however, must get the time element in his costs well settled in his mind before he can hope to get a proper return for his work.

To better illustrate the importance of counting his every minute while at work upon the job, we will cite an example very common in the average automobile repair shop. We take, for instance, that a man is at work upon a touring car. He has taken down part of the car mechanism and is just in the midst of the actual repair work on the job when a man drives up before the shop, calls out the repairman to look over some part of his machine, which, though it may only require 10 or 15 minutes, or even a half an hour, has taken him from his other job and has naturally delayed its final completion. If the repairman does any work on the car of the man who called him out, he will, of course, receive some payment, but if the man is a regular customer and he has done little or nothing on the car, he will probably not take anything for simply looking over the machine. Here, then, is a half-hour, more or less, that must either be unjustly paid by the owner of the car in the shop, or the time is entirely lost.

Then, also, the automobile repair smith must realize that many repair jobs on the automobile require considerably more time in the preparation or taking down of the mechanism than is actually during the actual repair operations.

The Accounting System

The system necessary for taking care of the accounts in the average



THE TEXAS SHOPS OF CHARLES JONAS AND SON

will be surprised at the results secured by the shoeing.

Now, I don't want some expert shoer to scientifically denounce this class of shoeing. Just let him keep his shirt on, perhaps he has never thought of the idea. The reason we want these articles is because we want to tell the younger craft some of our experiences that have taken several years to find out, and if "them scientific shoers" know something better, let them tell it. Remember, this is for buggy horse-shoeing, and not track shoeing, yet it is worthy of thought to the track shoer. A man shoeing a horse that interferes invariably lowers the outside, for the reason is that when the horse interferes, he hits the ankle that is not in



automobile repair smith shop need not necessarily be complicated, but many advantages will be found in getting the system down just as simple as possible and yet complete. An excellent start for the average shop is to use simply a job or repair tag and one book which do service both as a cost book and a ledger.

The repair tag is shown in the accompany engraving and is divided, and has provision for practically all of the data which may be required to accurately price a job as it is finished. In the illustration it will be noted there is space for the customer's name and address, a space for the date upon which the car entered the shop, and also a space for the date upon which it left; a number of lines on which can be written the work that is to be done on the car and then come several lines which are to be devoted to a list of the materials necessary to do the work, and the cost of these materials. Below this are several lines which may be devoted to several notes or remarks regarding the job. Finally, at the bottom of the tag, is a space upon which the worker enters his time and finally the total number of hours and minutes spent upon the work. In this way an accurate record of the job can be kept while the car is going through the shop. It is, of course, necessary that the shop employees be carefully instructed regarding the importance of keeping their time accurately on these tags.

In the cost record section of the book, a careful and accurate record is kept of all material which are purchased. This record can also be made a perpetual inventory by devoting a page or half-page to each

THIS TAG MUST BE
ATTACHED TO THE JOB AND
PROPER NOTATIONS MADE FOR
EACH PART OF WORK DONE - N^o 114

MR.

IN. OUT.

WORK TO BE DONE:

.....

.....

MATERIALS:

.....

.....

.....

TOTAL COST

REMARKS:

.....

.....

.....

DATE	WK'MAN	START	STOP
.....			
.....			
.....			
.....			

TOTAL..... Hrs. Min.

THE REPAIR JOB TAG FOR THE
AUTO SHOP

material used in the shop, noting the amount when purchased and the price, and then noting beneath this notation the amount of material used each time any is taken from

stock.

An entry on the same line of what was stated for the material thus used, will also show the proprietor when he is making a profit and when he is sustaining a loss on the materials used and the stocks he buys. The ledger end of this book is, of course, devoted to customers' accounts with a page or half-page devoted to each customer. Here, under the name of the customer are entered all charges and credits and thus every account is kept up-to-date and can be referred to at a moment's notice.

Prices Charged

There are no price lists to be suggested for the guidance of the automobile repairman. Unlike the practices that have been in existence in the blacksmithing craft since the beginning of time, the automobile repairman must treat each job as a separate unit. He must consider the materials used, their cost and then the time consumed in placing them on the car.

Of course, such matters as storing, cleaning and washing cars can be charged for at a flat rate and the usual charge for storage only, is \$5 per month. If, in the case of the medium-sized car, the storage includes cleaning and washing the car has needed, the charge usually doubles or triples to somewhere in the neighborhood of \$10.00 or \$15.00 per month. In the case of a larger car, storage and washing and cleaning runs as high as \$25.00 per month. Of course, the exact charges in any case depend upon the service that is given the owner and the service which he calls for and requires.

(To be Continued.)



THE NEW TOWN PUMP

Courtesy of The Country Gentleman

TIMELY TALKS WITH OUR SUBSCRIBERS



The American Blacksmith is published monthly at The New Sidway Building, Buffalo, N. Y., U. S. A., by The American Blacksmith Company. Incorporated under New York State Laws. Entered, February 12, 1902, as second-class mail matter at Buffalo, N. Y., Act of Congress, March 3, 1879.

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The Business Library

It is quite some time since we have mentioned the matter of collecting a business library and we simply inquire at this time as to how your library has progressed? Have you made a complete collection of all the business books being offered you by our advertisers? The days have long since passed when you can attempt to do business efficiently without having in your library the catalogues, booklets and literature of your trade. These books are almost as necessary to the efficient running of your business as are your accounting books, and certainly you are not attempting to do business in these modern days without keeping some record of what your business is doing for you and what you are doing for your business.

Never before in the history of advertising have the catalogues, booklets and advertising literature of business concerns contained so much matter of value and practical interest to the purchaser of advertised goods. With booklets on coal, welding, tire-repairing, horse-shoeing, treatment of horse diseases and of an almost unlimited treatment of other subjects, the smith of today is certainly missing a great opportunity if he does not secure some of the current advertising literature of the up-to-date business firms advertising in THE AMERICAN BLACKSMITH. Go through the advertising pages of this issue and see just exactly what advertisers are offering you in this number. If you will let our "Subscribers' Service" know what advertising literature you want, we will see that you get what you ask for.

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When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon him showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

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Did You Get Yours?

By the time you get this copy, we will have sent to everyone of our readers a package of Pink Buffalo Stamps. If you did not get your supply let us know immediately. These Pink Buffalo Stamps are free, they are plentiful and they protect. Do not send out a letter to a manufacturer, a jobber or a brother smith without attaching a Pink Stamp to it. We've got plenty of these pink squares and they are all ready to send out. All we need to know is where to send them. They help you get a square deal, they show other folks that you are a live craftsman and they protect your interests.

Service for Subscribers

Do you know that we offer a service to our readers and subscribers that is unsurpassed by any trade publication? Since the beginning it has been the aim of THE AMERICAN BLACKSMITH to serve subscribers first, last and always. From time to time we have announced in various ways in which we offer to help our readers until now our subscriber's service includes practically everything in which a modern trade journal can possibly help it's readers. Here for example are a few of the things we do for readers:

If you are in the market for any machines, tools or supplies of any kind, tell us what you want—we will put you in touch with the proper firms.

If you want a book on any subject and that book is not out of print, we can get it for you.

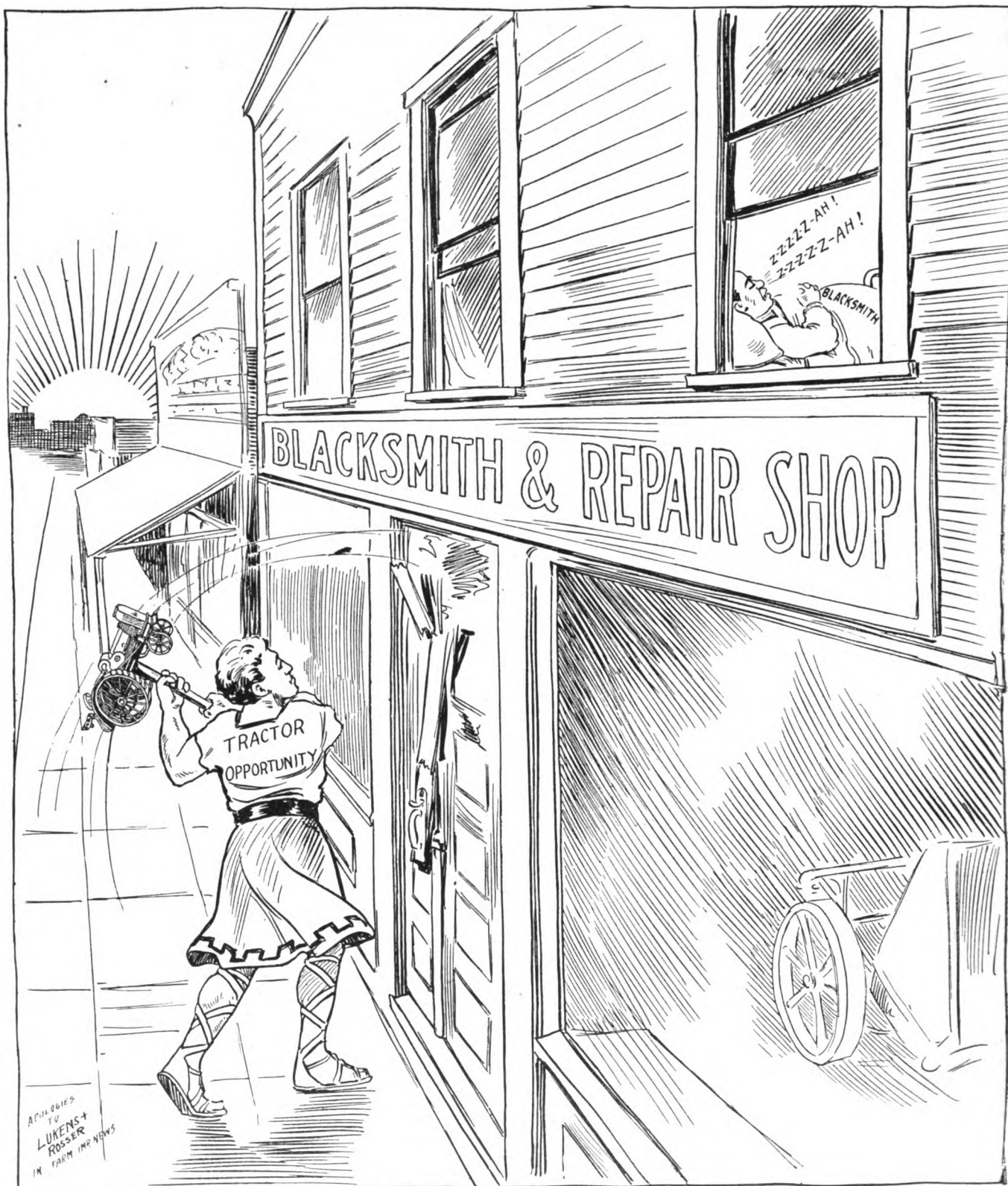
If you want information on any subject connected with the trade, ask questions freely and we will secure the information for you if it is at all possible.

If you want cuts for letter heads, bill heads or any advertising matter, tell us what you want to print, we will tell you what to use and how little it will cost.

If you want us to print letter-heads, bill heads and other literature, tell us what you want and we will quote you a price.

If you want a binder for your back copies, we can furnish you with either one of two styles. Our service department will describe the binders for you upon request.

We, of course, specialize in subscriptions to The American Blacksmith, but we handle your orders for other magazines as well. Ask for our price on any list of magazines. We can save you money.



WILL THE BLACKSMITH WAKE UP?

Opportunity is knocking, hammering and about to break in the door of the general smith. And opportunity's name is not only Tractor, but also Automobile and Motor Truck as well. All of these machines need and will continue to need repairs and repairing. Are you going to sleep or are you going to be up and doing? Are you going to be content to accept conditions as they are forced upon you by the march of progress or are you going to rise above conditions and grab opportunities? The time to grab opportunity is when He, She or It is passing. And now, Now, NOW is the time for you Mr. General Smith to awake and to fit yourself and your shop to care for not only tractors, but for automobiles and trucks as well. You cannot argue against progress—grab its opportunities.



Several Practical Helps for the Wagon Shop

Labor and Time Saving Tools and Devices Easily Made in the Shop

J. H. HAYDEN

IT isn't necessary, by any means, for the wagon and carriage repairman to put up with makeshift devices in his shop simply because he doesn't feel able to afford the modern machines now found on the market. There are so many machines and tools that can be made right in the shop that there is hardly any excuse for the wagon repairman to handicap himself with old-time, obsolete, makeshifts.

For example, take the old, wobbly wheel bench upon which the wheel wiggled and wobbled despite the efforts of the workmen with the added help of various sized bolts, nuts, wedges and what not. This old-time, temper strainer wasted more of the vehicle worker's time than a modern wheel bench would require for all the operations that can be done on it. Compare the old-time wheel holder with the device suggested in the engraving, Fig. 1.

This wheel support can be easily and quickly made from material readily found in the average general shop. The base of the wheel support proper is a large pipe flange. This is fitted with a piece of pipe of proper diameter and length and the top end of the pipe is fitted with a coupling. The bolt or threaded rod to go through the wheel hub is now fitted to go into the coupling at the top end of the standard. This may be done in several ways. After the coupling is run onto the pipe end a disk may be dropped into the coupling and onto the end of the pipe. The end of the bolt, B, in the engraving is then fitted with a nut or flange or if already fitted with a head so much the better. Now place the bolt, B, on the disk in the coupling and carefully center it and square it up plumb and straight. Then pour lead around it until it is held tightly in the end of the pipe coupling. Another method would be to center the bolt, B, in a pipe nipple to fit the coupling, pour lead

into the nipple to hold it in and then screw it into the coupling.

The other parts of the wheel holder are easily made and followed from the engraving, Fig. 1. The cones, marked C, C, are of wood, with a hole bored through the center of each so that they can be put on the rod, B. One of these cones is put on the rod permanently while the other one is removable for placing on the rod after the wheel has been placed on the stand. The second cone has a disk of tin or sheet metal fastened to its upper flat end so as to protect it from the nut, N, when this is screwed down on it to hold the wheel.

The nut, N, as will be seen, is fitted with a handle so as to be easily and

different sized wheels. The rod, R, has a hook on its upper end and is operated by the foot lever, L, which is fastened as shown. To facilitate the movement of the rod, R, a coil spring, X, is placed on this rod. It is held in place by a key above it.

This device can be used for doing almost all wheel operations. The spoke holder, H, with the rod, R, will enable the workman to drive spoke accurately and easily. Then, too, this device holds the wheel steady while tenons are cut and during rimming operations.

A simple gauge for use in connection with the wheel stand, is shown in Fig. 2. This spoke gauge, placed on the rod, R, and held between the upper cone, C, and the nut, N, will

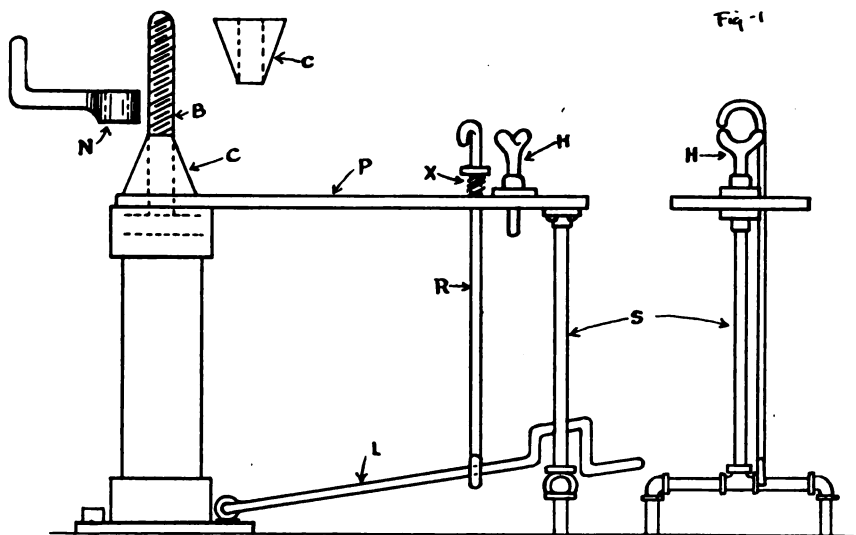


FIG. 1.—A MODERN WHEEL HOLDING MACHINE

quickly operated in fastening the wheel on the standard. The piece marked P, is a piece of heavy plank supported on one end by the pipe stand and at the other end by the support, S, which is made of ordinary pipe fittings as shown. The spoke holder, H, is a threaded rod with a Y forged on one end. The threaded end is allowed to turn down through a flange to allow for

enable the workman to accurately gauge his spokes. The gauge is cut out of a good piece of oak and trimmed down as shown. The hole at H is reinforced with a large washer or disk of sheet metal to save wear and to prevent the nut, N, of the wheel stand from cutting into the wood. The arm, A, is made to fit the long piece quite snugly so as to allow no free motion when the gauge is set.



This guage arm is held in place by a thumb screw. The markings on the long arm of the guage enable the user of the guage to quickly adjust the small arm.

Another practical help in the wa-

preceeding it, the leaves being held in place by means of clamps or clips until all the leaves are fitted.

Now a final word on utilizing the center posts in the shop. Usually the center posts are hung with all the

for economy in the use of such supplies.

An Important Thing to do When Selling Your Business

This rather unfortunate but interesting case comes to me from Ohio:

Before paying over nearly a thousand dollars which a certain firm of this city are claiming I owe them, I should like to get your opinion on the matter. I have read your regular articles ever since they first commenced, and believe my problem is in your line.

I conducted a business at the above address here until the first of last January. The firm name was Carter & Co., the Carter in the firm being myself. There was no company; I adopted that name because I liked it better. The business was conducted in that way for about 12 years. On January 1st last I sold out to a new firm, composed of three men who had been associated with me. One of them was named Carter and the others bore different names.

When I sold out I told a few people about it, but as the name was the same did not think it necessary to stir up anything by public report of the change. As it appears, the three men who bought me out did not have enough capital to run the business as it should be run and they are in trouble. They owe a Chicago house about \$1,000, which they cannot pay, and they are talking suit. In the suit they say they will bring me in because they never knew I was out of the business, and always supposed I was still in it. I see no reason why I should pay debts of somebody else. The name was not changed, but one of the news partners is named Carter and has a right to use his own name. I can't believe that they can collect anything from me, but will be glad to hear what you have to say.

James R. Carter.

This is not an unusual case. Men who buy an established business, with a well-known name, prefer as a rule—as they have everything to gain by it—that the name be left unchanged and that the public re-

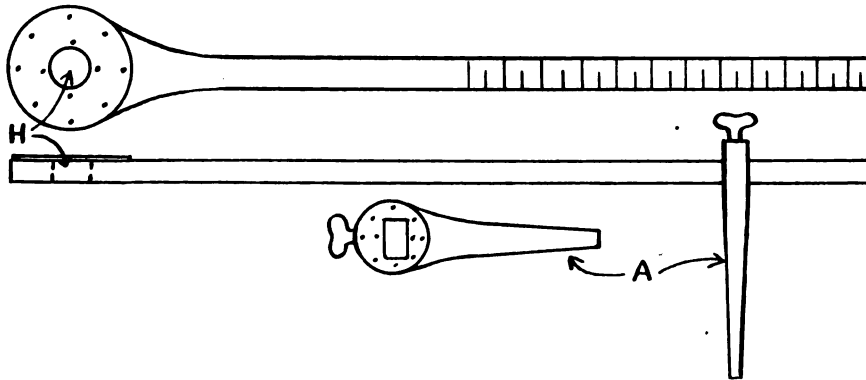


FIG. 2.—A SPOKE GUAGE FOR USE ON THE WHEEL STAND

gon and carriage shop and also one that will be of assistance in automobile work is the spring fitting stand or bench shown in Fig. 3. The bench top, T, is cut from a good, solid oak board. A good size for taking practically all springs is about five feet long and it need not be a foot wide. At the center point of this board a hole is bored and a flange fitted to take a threaded rod of suitable size. Then, at each side of the center hole long slots or mortices, M, M, are cut along the center line of the board. Now with proper supporting legs and braces the bench proper is finished. The threaded rod for the center flange is made from stock of a size fitting the flange used. One end of this rod is bent crank shape. The other end is then threaded and the extreme end cut down to a diameter to fit into the center holes of the spring leaves to be fitted. A washer placed on this end will facilitate the operation of the bending rod. The hooks for holding the ends of the spring leaf are shown at H. This is a threaded bolt with a hook end and a collar at C. These hooks are placed in the mortices, M, M, and are held by means of a suitable sized washer and nut.

In operation: the main leaf of the spring to be fitted, is placed on the bench, the ends under the hooks and the end of the center screw in the center hole of the spring. The handle of the screw is now turned until the main leaf is bent to the proper shape. Now the second leaf is heated carefully for its full length and fitted to the main leaf with tongs and clamps. The other leaves then follow in the same way fitting each succeeding leaf on top of those

tools, truck and junk that is too good to throw out and still seldom if ever used. Here the material gathers dust, dirt, and cob webs and discounts the appearance of an otherwise neat shop. If these center posts were fitted up as tool and supply racks or even an occasional work bench they would make for greater efficiency Fig. 4 shows a neat work bench built around a center post. As will be noted two cross pieces are bolted to the post—one on each side and then the bench planking is laid upon these to which the planking is in turn fastened. A bench of this kind can, of course, be made as heavy or as light as is needed for the work to be done on it.

Another efficient use for the center post is as a holder for cabinets holding screws, nails, bolts, nuts and other small supplies. And cabinets of this kind go a long way toward keeping the benches clean and clear of such materials and they also make

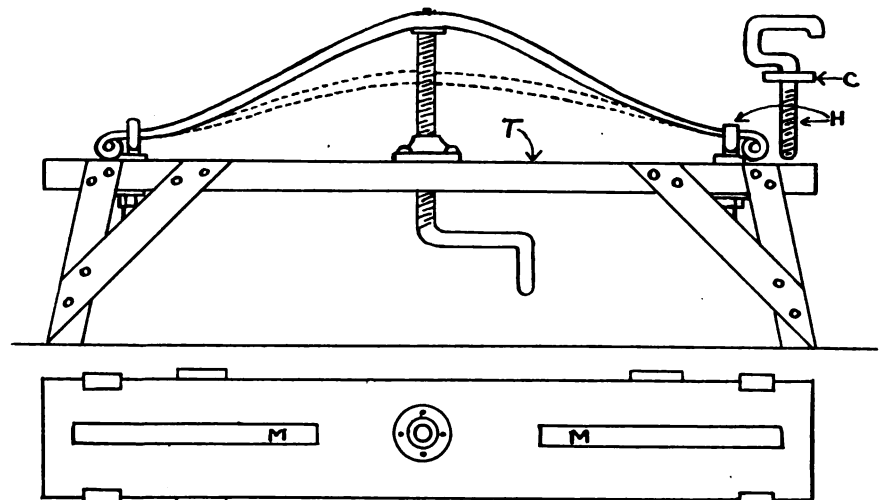


FIG. 3.—AN EASILY MADE SPRING FITTING BENCH



main under the impression that the same blood is in the business. Therefore whenever they can prevail on the former owner to do it, they do it, but he is an exceedingly foolish man if he agrees, for it leaves him just as liable for the debts of the business as he ever was. The

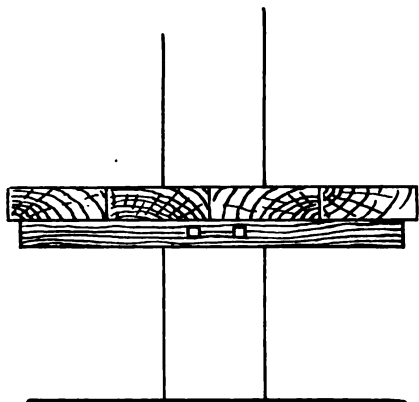


FIG. 4.—A HANDY BENCH ON THE CENTER POST

books are full of such cases and they have all been decided in the same way, unless there were some facts to take them out of the rule.

There are no facts in my Cincinnati correspondent's report of his case to take it out of the rule. If the Chicago house is not one of the "few people" that he told, he is undoubtedly liable for the \$1,000 debt, and also for every other which was incurred on the strength of the belief that he was still in the business.

I quote from the decision of the court in a well-known case, the point being the identical one under discussion:

It may be regarded as well settled that when an ostensible or known member of a copartnership retires therefrom, and wishes to shield himself from liability for future debts of the firm, it is necessary that personal notice of his withdrawal be given to all who have had dealings with the firm, and that notice be given by publication or otherwise to all others.

The defendant was liable to all persons, knowing his former ownership of the business, who extended credit to the firm after the transfer of the business without public or personal notice of his withdrawal therefrom, although they had not transacted business with the firm before. It follows, therefore, that the plaintiff was entitled to recover the amount of his claim.

The correspondent's fatal shortcoming is that he failed to give public notice to the world when he parted with the business. If he had done that, he would not now be responsible for these debts, even if those who sought to hold him liable had not seen the notice and actually knew nothing of his withdrawal.

In a very few words I can give a

safe rule for withdrawing from a partnership or—if you are the sole owner—selling the business to others. A very careful list of all of the firm's creditors should be made. Not only those then selling to the firm, but those in the habit of occasionally selling to it. I repeat that this list should be compiled with the utmost care, for if the name of one creditor is omitted, and he fails to get the notice, he may have a claim against the retiring owner or partner, particularly if the business is going to go on under the same name.

A clear announcement of the withdrawal or the sale should then be sent to every name on the list, in envelopes printed on the outside so they will either be delivered or returned.

In addition to this special notice, a general notice must also be given to the general public by advertising the withdrawal or the sale in the newspapers. Usually there is no rule as to how much advertising needs to be done—the law merely requires that it should be *reasonable* notice. In ordinary cases once a week for four weeks in two papers would be sufficient, if it was in a city. If in a country town, where there are fewer papers, one paper would probably be enough.

The theory which the law goes on

member of it, so that he can exercise his judgment as to whether he will go on selling it.

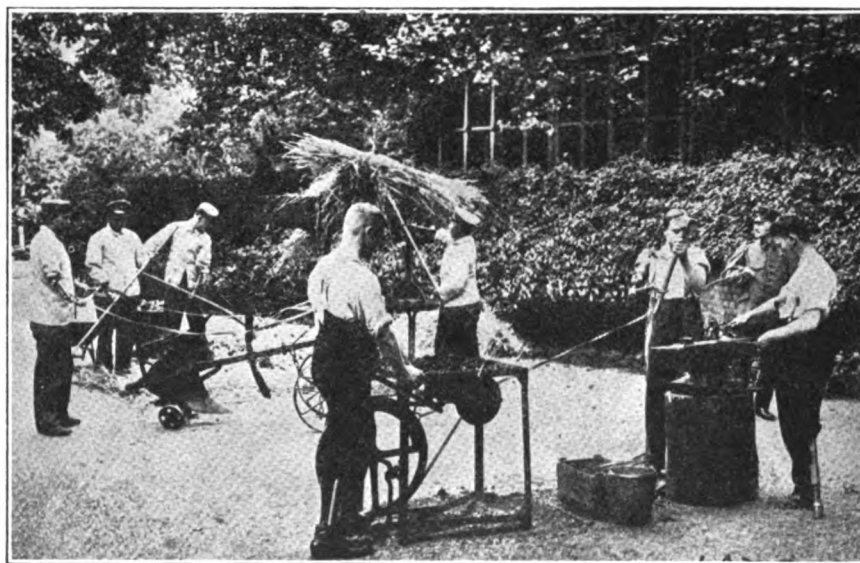
(Copyright by Elton J. Buckley.)

Fire Prevention in the Smith Shop

This subject receives all too little attention in these days when "prevention" rather than "cure" is the watchword.

Here is what "New Jersey Blacksmith" has to say on the subject suggested to him by the short article in December.

"I was very much interested in a short article in December's number of 'Our Journal,' entitled 'Fire Preventions in the Smith Shop.' I have a two-story frame shop, 20 by 40, with a 10 by 14 office attached, which is also two stories high. There is a shingle roof on the main shop. The second floor I rent to a plumber. We use city water, and I have pipes running through the whole shop. I have two outlets on each floor inside; one to which I have a $\frac{3}{4}$ inch hose attached. At the roof scuttle hole, I have a good rubber hose, so that in case of fire, I can care for the roof. I also have two outlets downstairs on the outside; one on the front and the other on the rear, so when I set heavy tires, I attach the hose and cool them. (It beats



A GROUP OF MUTILATED SOLDIER WHO WITH PATENTED ARTIFICIAL ARMS AND LEGS ARE ABLE TO DO PRACTICALLY ALL KINDS OF WORK

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in these cases is thoroughly fair—that a man who has granted credit to a firm in the belief that John Jones—who was honest and responsible—was a member of it, ought to be told when Jones ceases to be a

the old way of carrying the water in buckets to the wheel platform).

"In winter, it is necessary to drain the pipes, but they are so arranged with stops and drips on each floor, that this can be done with



ease. I have it so arranged in the cellar, that I may shut off the whole system at any time, or fill the pipes at a moment's notice."

This is another excellent idea along the "Safety First" policy that is worthy of following. Other smiths have no doubt made similar provision in their shops to guard against fire. We would like to have a full discussion on the subject.

A matter that bears directly on this very subject is mentioned in a letter just recently received from a Western Smith who complained of the high rate which he is compelled to pay on his shop insurance. It is a well known fact that factory and office buildings with automatic sprinkler systems are given an especially advantageous rate because of being so equipped. And isn't it reasonable to believe that a smith shop, in which the fire hazard is materially reduced by some arrangement for not only preventing fire, but also for combating it when it does occur, would receive similar consideration from the fire insurance companies?

Let us have a thorough discussion of the matter. Send in your ideas on the subject for the benefit of smith shop owners generally.

Painting Ironwork

ARTHUR W. JORDAN.

It is not so often the business of the blacksmith to paint iron as it is to forge and fashion it to such shapes as it may best answer its many purposes. It is, however, necessary at times for a smith to finish his work by giving it such coatings of paint as may better enable it to answer its particular purpose. Therefore a few hints on this subject which is none too well understood may not be out of place here.

There will doubtless be several things to take into consideration in settling what the final color may be of any piece of ironwork, and this will be dealt with presently. There are, however, no considerations to be taken into account in deciding what constitutes the best materials for the first coat of paint save that of practical utility. On this point the general consensus of opinion, by those best qualified to know, is that no finer mixture can be found for first coating than pure red lead and boiled oil. This mixed to a proper consistency and applied as soon as made up, on iron cleaned to receive it and if warm all the better, is a firm set elastic foundation for any further coatings. Not only is it this,

but as far as it can be said for a covering on such a material as iron, it is penetrating and searching having an affinity for the metal it covers. This and this alone ought to be the foundation coat in every case where iron is painted.

However, as first mentioned it is necessary before anything is applied

thing to go over the iron with a wire scratch brush of any shape or form best suited for the purpose, so long as it is well applied and all rust removed. If rust is rather thick an application of kerosene will help it to scale off under the wire brush, but the oil must be burned off afterward.



IN THE HINDENBURG ANXILARY HOSPITAL AT KONIGSBERG. A TWENTY-NINE YEAR OLD SOLDIER WHO IN SPITE OF HAVING LOST BOTH HANDS KNOWS WHO TO HANDLE A HAMMER AND PUNCH

to iron that the metal should be in a fit state to receive it. Iron should be as clean as any other material before it is painted for no man can paint successful on dirt. Any grease or oil should be burned off thoroughly over a fire or with a spirit lamp, and any moisture should be driven off in a similar way. When all doubt as to these, or any other likely causes of trouble, are removed it is a good

After applying the first coat, the question comes, what next? That depends on whether the iron is to have two or three coats and for what purpose it is to serve when painted. Now it is safe to say that few pieces of ironwork can do with only two coats of paint and be satisfactory. Such a pose opinion has the writer of such practice that he scarcely thinks it worth wasting any time on.



Iron, above all materials, wants well protecting from the weather and two coats of paint will not do it. Besides, in no case should it be daubed over with coats of thick paint at all; the consistency should be somewhat thinner than for covering wood, therefore it should be well brushed in and a satisfactory coat under such conditions cannot be obtained in less than three applications.

Well, assuming the three coats, the second should be made up of equal parts of red lead and lamp black, mixed with equal parts of boiled oil and turpentine. The lamp black should be the best drop black and the proportion of it may be less than an equal part without detriment, if preferred, as it is only to form a colouring base for the final coat. If the finishing coat is to be of any fancy colour, instead of the lamp black add about the same colour of the chosen pigment instead. "Fancy color" is written advisedly, because there is only one true natural colour for ironwork, and that is black. That is not only the writer's opinion after many years of practical experience, but it is that of all the best authorities that is, those who have applied their minds to the subject.

It is safe to say that ornamental wrought ironwork never looks so well in any other finish as a plain black egg shell gloss. Years ago church fittings of iron were painted all the colours of the rainbow, because it was erroneously said that black was not an ecclesiastical

colour, notwithstanding the fact that both the Auglican and Roman churches use it on Good Fridays at funerals and on other solemn occasions of mourning. Now better conucls prevail and as a rule the best wrought ironwork is painted black, whether for church use or not, and generally with a mixture now to be described.

Some people use a paint for finishing made of lamp black mixed with oak varnish and thinned down with turps only, and very well it answers, but the best firms use the following excellent paint: Take 7 lbs. of lamp black paste and $\frac{1}{2}$ lb. of litharge and mix them with $\frac{1}{2}$ pint of oak varnish and $\frac{1}{4}$ pint of boiled oil. In a can, over a gentle heat, dissolve $\frac{1}{4}$ lb. of beeswax in $\frac{1}{4}$ pint of turpentine. When the wax is thoroughly dissolved stir the turp into the paint, adding nothing but enough turpentine in addition to that containing the wax to bring the whole to a proper consistency. This paint dries quickly with a nice dull egg shell gloss and is very durable and suitable for work exposed to the weather. It is probably the finest finishing coat that can be given to ironwork and is generally used for high class work.

This finish should prove an excellent one for small work as well as large. Such things as andirons, lamps, bowls and the like generally look well with a good, dull black finish, especially when surrounded by heavy oak furniture of mission type.



The Horseshoer

Breaking and Training Colts

PART IV.

V. G. STAMBAUGH.

Bad Habits

Horses that have been properly handled and trained are not balky, neither do they have bad habits. When horses with bad habits are encountered a careful study of each case should be made in order to ascertain the cause, and, if possible, to remove it.

Balkiness

The most common cause of balkiness among horses is punishment to make them do something that they can not do or that they do not understand how to do. Another common cause is the forcing of horses to draw heavy loads without allowing them to stop occasionally to rest and regain their breath. The use of the whip or spur in such instances should be avoided, as the pain inflicted will be very likely to provoke further and more stubborn rebellion. If a horse balks, the bearing of the harness should be examined to see if it is hurting him. If a heavy load is being drawn and the horse is not allowed to rest and regain his breath and strength he may become sulky and refuse to pull. Give him a short rest, and while he is resting rub his nose, pick up a front foot and tap the hoof a few times, or adjust the harness, and he may forget his grievance. Take the lines and give the command to go ahead, turning slightly to the right or left to start. If the horse does not start it is either a case of overload or a chronic balker. If the load is so heavy it can not be drawn, unload. If the horse is a chronic balker a course of training will be necessary to overcome the habit.

In older horses where the habit of balking is fixed the horse should be trained to obey all commands with

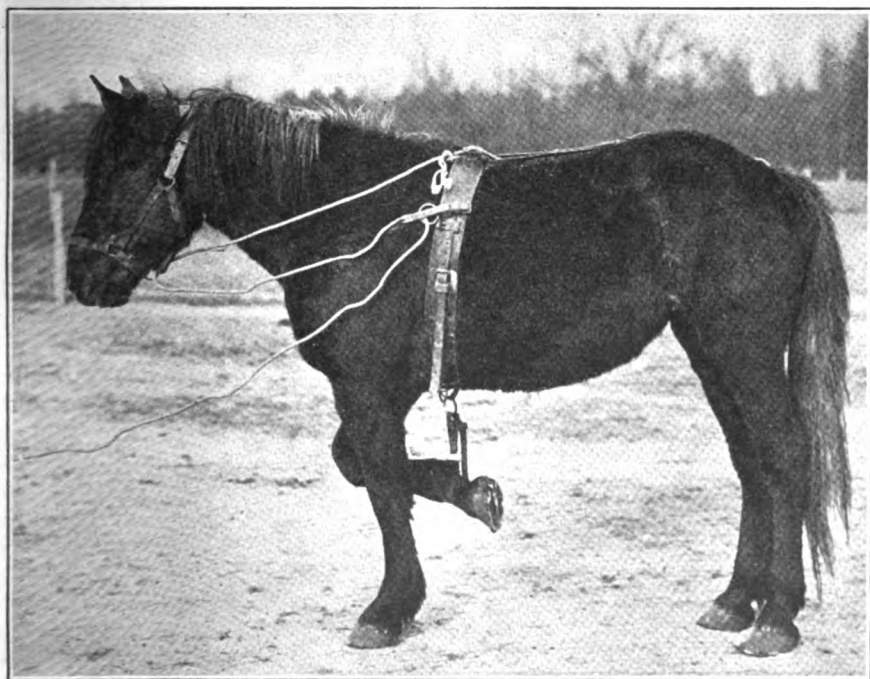


FIG. 9.—ARRANGEMENT OF ROPES TO THROW A HORSE



promptness without being hitched to the wagon. First put on the double trip ropes and use them until the horse stops and stands when he hears "whoa." Next put on the guy line, which should be managed by an assistant, while you drive and

knees. The lessons should be continued until he submits to the poles dragging between his legs and all round him. This is a good lesson to give before driving single.

To Throw a Horse

To throw a horse, put on him a

rope collar and out to the side; tie up one front foot. As the horse is backed up his hind feet may be pulled forward with these ropes and he can then be easily thrown on his side.

Harness

Harness should be kept clean and well oiled. It will then be less liable to cause sores on the horses and will last longer. Before the harness is oiled it should be taken apart and thoroughly washed with soap and water. When nearly dry apply neatsfoot oil with a sponge or a woolen rag. Do not hang harness in heat or in the sun to dry. A tablespoonful of lampblack with 2 ounces of melted beeswax may be added to the oil for a black dressing. Fish oil may be used on harness, or prepared oils may be secured at harness shops. All parts of the harness should be strong.

Every horse should have its own collar, which should fit snugly to the neck from top to bottom. Most sore necks are caused by large collars or by draught being too low on the point of the shoulder. To fit a new or an old collar to a horse soak the collar over night in water, wipe it off in the morning, and fit it on the horse. Work moderately through the day. The collars should be examined every morning and the bearing surface kept clean and smooth. The horse's neck should be kept clean. A good plan in hot weather is to wash it every night with a weak solution of salt water. Keep the collar and hames buckled tight.

Before hitching to a wagon be sure that the neck yoke is safe and that the traces will not become unfastened.

Importance of a Good Mouth

When we say that a horse has a good mouth we mean that he readily obeys the signals conveyed to him by the reins and bit and that he will also "go up on the bit" in his work without pulling. A horse is held steady and true in his gait and at all times is under better control when he is "up on the bit."

Always see to it that the bridle on the colt is properly adjusted, and never use a severe bit. The bit should be adjusted in the mouth tight enough so that the rings will not be pulled in, but loose enough so that the corners of the mouth will not be pulled or stretched up. The bit should rest on the bar, above the tushes.

Always train the colt to walk rapidly. There is no gait so valuable and useful in a horse as a rapid

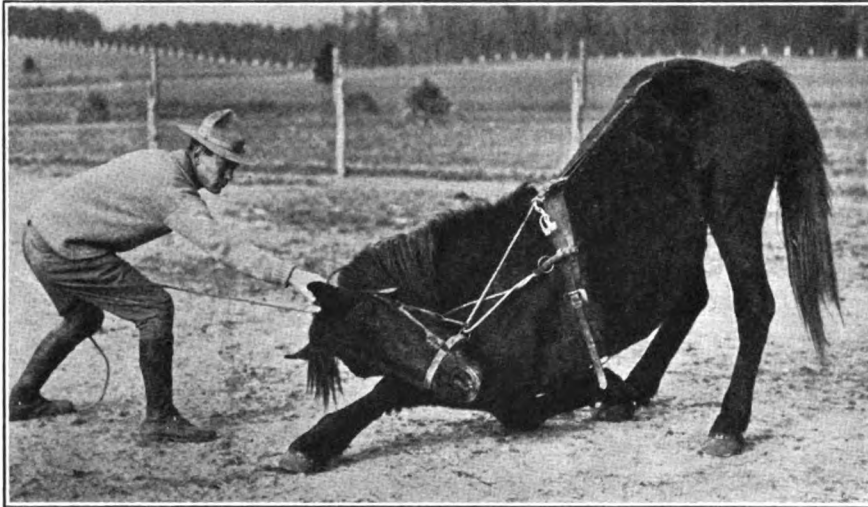


FIG. 10.—THROWING A HORSE

attend the trip ropes. The guy line is a rope fastened around the horse's neck and a half hitch over the lower jaw. It is very severe and should not be used to excess. If the horse shows any tendency to balk, give the command "whoa" before he stops of his own accord. When ready to start, the assistant should take a position in front of the horse and smartly jerk him forward with the guy line at the same time you give the command "get up." Repeat the process of stopping and starting until the horse shows no sign of self-will. Use the guy line, and use it severely, on the slightest intimation that the horse is going to balk. After a few of these lessons the horse may be hitched to the wagon. The trip ropes and guy line should be kept on until he is well broken of the habit.

Kicking

A horse that kicks when something touches his heels is dangerous to drive. To overcome the habit, put on the harness and the trip ropes. Take a stick and pole him all over, as described under "Breaking to lead." After he becomes submissive to the pole, tie sacks of hay to the traces and breeching, and continue the lesson until he pays no attention to them.

Fasten a long pole on either side with one end to drag on the ground, the other end to be fastened to the shaft carrier. Drive him around with these, and if he attempts to kick command "steady" and pull him to his

surcingle with crupper, with a 2-inch ring fastened in the top of the surcingle. The surcingle and crupper may be made with one piece of rope. Double a 15-foot rope at about one-third its length and slip a 2-inch iron ring over this doubled portion. Tie a knot in the doubled rope to hold the ring. The loop should be put under the horse's tail for a crupper, and the ends of the rope form a surcingle. The surcingle should fit tight.

When the surcingle and crupper are adjusted take a 20 or 30 foot rope, pass one end through the ring in the backband of the surcingle along the side of the horse's neck, through the ring in the halter, back to the backband, and tie; tie up the front leg on the side on which you desire the horse to fall, the rope from the backband to the halter being on the opposite side. The noseband of the halter should be well down on the horse's nose and fit fairly tight.

Allow the horse to stand for a few minutes, and then with the pulley rope draw his head to one side; he will drop to the knee that is tied up and may be easily thrown over on his side. When he tries to get up pull his head to the backband.

Another method is to put straps with rings on the pasterns of the hind feet, tie a loop in the middle of a 40-foot rope, fit the loop on as a collar, running the ends through straps on pasterns, back and through



walk. It is not difficult to train the average colt to walk fast. From the very beginning keep him walking up to his limit, and he will get into the habit.

When a horse trots make him trot "up on the bit"; he will have a better head and neck carriage, will be less liable to stumble, and will give his attention to the driver.

A colt's mouth may be spoiled by severe bits, by a too tight adjustment of the reins of the biting harness, by tight check reins, by unnecessary jerking and lugging on the lines, or by a poor driver.

Horses for racing, high-stepping carriage horses, and fine saddle horses require special schooling and training, and their development had better be intrusted to the regular trainers.

Beating the Chronic Dead Beat

Anything that will help the smith in the continuous battle for money between the business man and the "dead beat" is of interest and value, and as the "beat" often uses strenuous methods in his efforts to get something for nothing, it is necessary for the smith to retaliate in kind in order to get the money to which he is rightly entitled. Several methods have been used by shoers in order to force the "dead beat" into turning over the money he is so reluctant to part with, but which the shoer finds so necessary in order to live. One of these methods for beating the "beat" at his own pastime is described by Mr. W. H. Respass of Florida.

"Perhaps you haven't thought of it: Take a good stout chain with a lock on it and fasten it securely to the shoeing floor. When the chronic dead beat comes in with a horse and a determination to beat you out of a set of shoes, just "tie" his horse with the lock and chain. Of course, he is sure to ask why you use a chain on his horse, and to say, "That horse'll stand without hitching." Then simply tell him that some men come in to claim their horses, after a shoeing job is finished, and say they haven't any money or give one of a thousand other excuses, and that the lock and chain idea is simply your method of insuring that the horse doesn't get away until you get your money."

There are no doubt many other stunts used by smiths to beat the dead beat at his own game. If your use or know of one or more, tell about them in these pages.

What the Oklahoma Association is Doing

The Oklahoma Association of Blacksmiths', Horseshoers' and Wagonmakers', already in its seventh year and going strong, is planning still greater things for the future. To quote from Secretary Reedy's letter he is: "planning some special notices to members, and to the Craft in general. Cards to be posted in all shops. Frequent cards to the members. News items to all papers that will use them. I aim to keep the Traveling Men supplied with all necessary cards, circular letters, clippings from the State Papers, etc.

"Thus, beginning NOW, we hope to line

needed by the State Secretary: Names and addresses of all shop owners, all blacksmiths, horseshoers and wagon-makers, who are employed regularly in their trades, all newspapers willing to disseminate the literature of the Craft, and names of those willing to assist the Secretary in the forming of the city locals, county auxiliaries, and district conventions.

A special circular letter will explain the semi-annual tour of the State. Necessary Constitutions and By-Laws will be prepared, and blanks and forms will be provided for elected delegates to its meeting.

Any community having three or more of the Craft, may form a local; in places where only one or two reside, they will be asked to join the most convenient local and county auxiliary.

Two or more locals in a county may



FIG. 11.—HOLDING THE HORSE DOWN AFTER HE HAS BEEN THROWN

up two or more District Conventions, a semi-annual trip or tour together, following one line of railroad going, and another on the return trip; the craft in the towns as reached to be asked to join those already on the train, making as much of the trip as their location and time will permit. Demonstrations of various sorts to be planned wherever practical; sometimes mechanical, at others, by addresses, and not least by exhibits of shop appliances, etc."

Secretary Reedy also outlined the activities of the association to the Press of the state in an article as follows:

The purposes of the State Association include everything beneficial to the Craft of the State; working through Locals, Auxiliaries in each County, District Conventions, and in the State Annual Conventions.

To realize the proper organization of city locals, county auxiliaries and district conventions, the following information is

form a county auxiliary, which includes each member of the locals; two or more counties may form a district convention. The district convention will include all members of each local within its bounds, provide for elected delegates to its meetings; and elect delegates for the State conventions not inconsistent with the State constitution, and care for all propaganda work in its territory under the regulations adopted by the State Association.

Correspondence is desired with the Craft in each town and county, as early as possible. If you are interested, write the Secretary at once for detailed information, blanks, and methods of procedure. **YOU ARE NEEDED AT THIS TIME TO PUSH OUR ORGANIZATION FORWARD TO ITS LAWFUL PLACE AND PRIVILEGES IN THE INDUSTRIAL FIELD OF THE STATE. ARE YOU WITH US?**

Those smiths who are interested in what this live organization of Oklahoma is doing, are invited to get in



touch with Mr. James J. H. Reedy, Secretray, at 19 East Archer St., Tulsa, Oklahoma.

Another Safety Tool for the Blacksmith

J. W. H.

The safety tools pictured and described have interested me and I am using some of them and like them. I have a tool that I made for breaking test bars when casehardening. This device as shown in the engraving, is a box with an open bottom and a one-inch hole in the top to admit the punch for breaking the test bar.

The box is made of 1/16 inch plate and is 2 1/2 inches high by 2 1/2 inches wide and of a length (usually 8 inches) suitable for the test pieces used. A handle riveted on one side of the top of the box enables the user to hold the box in position with one hand and the punch by means of a pair of tongs with the other hand.

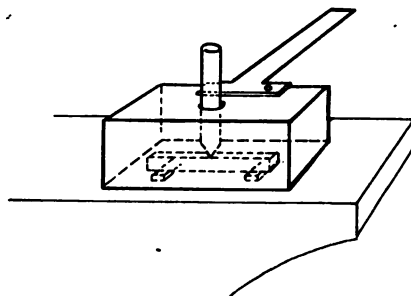
In use, the test bar is laid on two short pieces on the face of the anvil in the usual way. The safety box is now placed over the test bar, the punch inserted in the hole and held with a pair of tongs. The helper then brings his sledge into action and the test bar is broken without endangering any one. The engraving shows the box in place on the anvil over a test bar ready to be broken.

Other Uses for Coal

BERT HILLYER.

Generally smiths look at their coal for only one purpose, i. e., to heat their iron or steel. That it can be made to take the place of steel tools may sound strange until the reader has tried these kinks and proven to himself that it is true. He will find that in bumping out different shapes over a form or die it gives better results than if a steel tool were used. To make it plain, suppose we are going to make an ornamental base like the one shown at A in the engraving, out of either copper or soft steel, 1/8 or 1/4 inch thick. We will take the copper first. After annealing the copper disc, place it over the female die. Now we are not going to the expense to make the male die, but are going to use fine soft coal in its place. A handful is placed on top of the copper piece; a light blow is struck by the steam hammer and the impression is started. As more coal is added and pounded in, the piece gets deeper and the coal packs in tighter

and spreads itself in all directions, forcing the metal in all the different grooves or shapes of the form, even to the fine small marks on the side as well as the bottom. This cannot be done with the male steel die as it has only the down pressure with no side pressure. Another thing in favor of coal, it does not cut the metal at the corners like a steel die. Another is it doesn't have to be started straight like a steel die because it follows up where the least resistance is until the metal is forced up



ANOTHER SAFETY TOOL FOR THE SMITH

against the walls of die and a perfect form is the result. In bumping out sheet iron it is necessary to heat the piece, and also to keep the coal from burning. To do this place a piece of sheet asbestos between the hot plate and the coal. Then proceed as explained.

Another use for soft coal is in driving out the handles of sledges. If all the other ways have been tried to drive a tight handle out of a sledge and it has failed, try this: Place the broken end of the handle down one of the holes in the swedge block. Then place a lump of coal, about the size of a walnut, on top of the other end of handle as at B. Then hit it a good, hard, square blow with a sledge. Place another lump on the same spot and hit it again. Repeat this until the handle comes out, which it surely will, no matter how tight it is.

Another use for coal is in punching holes in heavy iron. In punching deep holes, the punch is liable to get hot and stick if there is nothing used to help free it. A little, fine soft coal (see engraving at C) dropped in the hole after it is first started, does the trick and makes punching out easy.

These uses for coal will no doubt be new and novel to a good many smiths and while just a few uses are suggested here, these hints will no doubt suggest other uses for coal that are particularly adapted to the work of the individual smith.

The Theory and Practice of Hardening

J. C. WEST.

(English Mechanic.)

The following examples of working, hardening, and tempering are given as illustrative methods applicable to certain classes of steel articles, rather than solely as directions of how to proceed in those particular cases.

Lathe, Planer, and Chipping-Chisels

In forging, these should be heated in a fire made with coked coal, as coal in its natural state contains sulphur, which will combine with red-hot steel on contact with its surface, and chemical affinity will convey it from molecule to molecule through the whole of the red-hot part of the tool. Well coking the coal previously drives off the sulphur in fumes. The steel should be placed in the fire six or eight inches from the tuyers, so that the blast may have to go through plenty of live embers before reaching the steel. This insures a hot blast, and—which is most important—deprives the blast of its free oxygen before it touches the steel. Heated carbon-dioxide cannot abstract any of the carbon content of the steel when red-hot oxygen, does; and with each heating the steel will "perish" more and more, the surface suffering most, and so to the centre of the steel gradually. Charcoal is much better than coked coal, as it is perfectly free of sulphur, needs less blast, and gives off carbon-dioxide more freely.

Steel may be heated for forging considerably above its calescence-point without injury, but of course not to the point when it becomes "burnt"; and the greater the percentage of carbon steel contains, the less degree of heat will it bear to "burn" it. When the steel leaves the fire first, it will bear heavy blows from the hammer; but as the red heat darkens, these should be lighter and lighter, as there is more and more likelihood of developing internal cracks or of forming a partly separated shell or skin on the outer parts. When the steel is very nearly finished in shape, light, rapid taps may be given it, after it is black, with advantage, as this makes the grain or texture finer, and the steel tougher. No attempt should be made at forming the bevel of the edge of the tool on the anvil. The end should be left square, for a thin part like the edge is liable to decarburise, or "perish," faster than thicker parts whilst in the fire. The edge is best formed on the grindstone or wheel after the chisel is tempered. When the forging is finished, heat the chisel to a cherry-red and anneal it. This will disperse the internal stresses produced in forging, that may otherwise tend to crack the tool, after hardening, when it is in use. Now grind the "finish" on the tool; but leave grinding-up the edge until after tempering, for the reasons given.

It may appear that some of these directions are superabundant precautions; but my aim is the best attainable. Those who desire less than this can ignore these directions. Only, there is this; those who follow them will get a result well worth the additional trouble. A tool that will last out its work is worth a dozen that will not.

The part of the chisel that is to be hardened should now be covered with linseed-oil and lampblack (or with the special paste the receipt of which has been



given), and dried on the fire. Prepare a fire of coked coal for the bath; green coal gives off so much smoke that the worker's view of the inside of the bath is obscured. Make the heart of the fire six or eight inches from the tuyere, to protect the bath from the action of a naked blast. Put the bath in the fire with a pair of curved tongs, and as there is no danger with these figures of warping—from one part getting its heat before the other parts—the bath can be made a dull-red-hot before the chisel is inserted. It will only be necessary to insert as much of the chisel as it is intended to harden; nor will the chisel crack on quenching at the point where the molten metal reaches, as conduction will carry the heat sufficiently further in graduation to avoid a sharp line of demarcation.

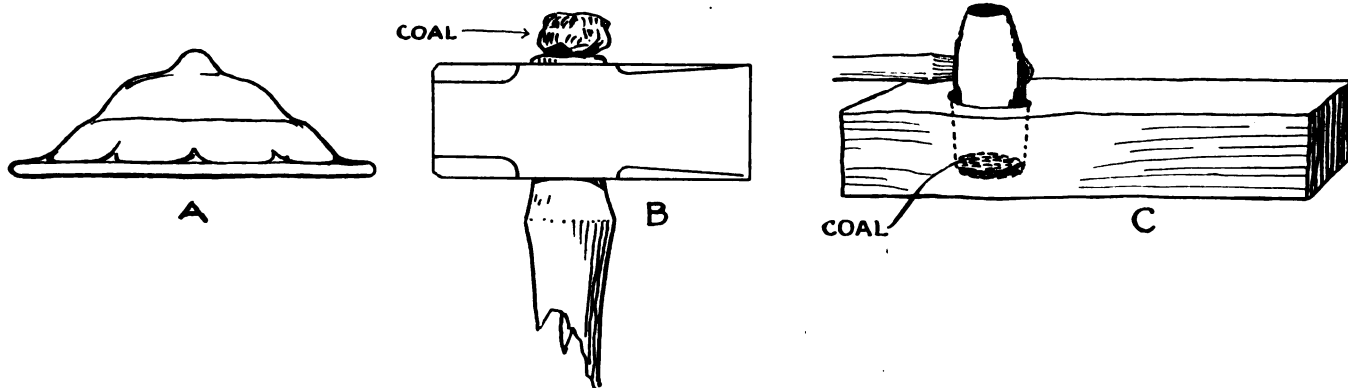
A rod of about one-eighth to a quarter of an inch should have been forged out of the same steel as the chisel is made of, to use as a test-rod to ascertain heat of bath. As previously directed, powdered charcoal should be put on top of the molten bath when lead is used. When the chisel is inserted in bath, the test-rod should be withdrawn and quenched, tried with a file for hardness, and, if found soft, dried in the fire and again inserted in bath. One puff from the bellows should be given; a short wait, and then the test-rod tried again. It is best that at the first trial of the test-rod it should not be hot enough to harden, as this insures that the bath and contents have not passed the calcescence-point of the steel unrecognized. As soon as test-rod, on quenching, becomes hard, the calcescence-point of that grade of steel is reached, and the chisel should be taken from the bath immediately, and the whole of it plunged vertically

in contact with the steel in a given time. The chisel now being "dead hard," it is necessary to soften or temper it to a lower degree of hardness, suitable for the purpose for which it is intended. This may be done by several methods. I will describe the least efficient first, as it is the most general, and I will point out why it is inferior to the others.

What I may term the creeping method is as follows:—The chisel is first brightened by grinding the sides for an inch or two, and then excessive heat is applied to the shank somewhere near the hardened part. Different ways of applying this heat are used: the flame of a gas-jet or a blow-pipe, a heavy pair of smith's tongs or a piece of bar-iron made of red-hot, a heated tube—anything hot enough to give sufficient heat to the shank of chisel. The heat creeps down the shank to the edge of chisel by conduction, the hottest part being the point of contact, and the coolest being the edge of chisel. The tempering colour is watched creep down towards the edge until it is pudged to be the right shade. The chisel is then plunged into water to check any further creeping of the heat. Now, a moment's thought will show that if a right temper has been attained at the edge, the first grinding will produce an edge a little softer, and each subsequent grinding produces a softer edge than its predecessor. Probably some may object to this method being challenged, and say that it is absolutely necessary, because if the whole of the flat part of a chisel was of a cutting temper, the first time it was used the strain would cause it to break off somewhere above the edge. Admitted; but it is my purpose to describe methods by which neither of these bad results will follow, and even though these

and that the addition of lead to tin should lower the melting-point of the alloy 108deg. F. Still, it is elementary knowledge that alloys have lower melting-points than their component metals—steel and carbon, to wit.

To temper the chisel just hardened, fill the bath with pure tin; take a short length of clock-spring, brighten with emery-cloth; melt the tin and insert the piece of spring in it. A straw-colour oxide will appear on the spring steel at once. If this is too light a shade for the temper required, give a slight puff with the bellows, and test with spring again. If by accident the bath should be made too hot, it can be lowered by inserting a bar of cold iron; but it must be remembered that the slowness of the spring steel acquires the heat of the bath at once, and with little effect upon the heat of the bath, whereas the chisel, being of more bulk, will lower the bath's temperature in abstracting its own heat. Examine the edge of the chisel, and, if not dark enough, plunge it in bath again. Do this again until the required shade of colour appears, and then plunge into water. It is important that the bath should not be of a higher temperature than that of the colour required, for although the right colour may be obtained by quickly plunging the chisel in and out again, the heat would not have time to equalize through the hardened part of chisel, and therefore the chisel would be harder in the centre than at the surface, exactly opposite to what gives the best efficiency. Of course, the whole of the hardened part of chisel will now be of the same temper, and therefore liable to break at a distance from the edge if subject to stress. To obviate this, the hardened part of chisel must have the temper lowered to a blue, with the excep-



MR. HILLYER TELLS OF SEVERAL WAYS TO USE SOFT COAL IN THE SMITH SHOP

into cold water. "Soft" water gives the least hardness, "hard" water greater hardness, brine-water greater still, and sulphuric acid and water a greater hardness—the explanation being that as the boiling point of the quenching medium is raised, the heat is abstracted from the steel more rapidly. It will be understood that on the water's contact with the heated steel, a cushion of steam is generated around the steel, which prevents as close a contact between it and the water as is desired. Therefore, the higher the boiling-point of the water, the more heat is abstracted from the steel to generate steam, and thus the heat leaves the steel more rapidly. In my opinion, in addition to this there is another cause at work: the brine, etc., being of greater gravity, and the gravity of steam being the same whatever its source, the steam is forced to the surface faster, so that more water comes

methods take rather more time, it is time spent to advantage.

A much more efficient method is to prepare a bath exactly as before described, except that, as lead fuses at about 608deg. F., this temperature is too high for the temper of any cutting tool. Tin fuses at about 443deg. F., and as the temper-colour of very much the greater number of all cutting tools is above this, tin makes an excellent tempering medium in molten baths. For those tools requiring a temper-colour of a temperature lower than 442 deg. F. an alloy of tin can be used. One part of lead to three parts of tin is said to melt at 334deg. F.; equal parts of bismuth and lead melts at 257 deg. F.; equal parts of bismuth and tin at 286deg. F. I have not tested these melting-points, and it is certainly strange that the substitution of tin for lead in the last alloy should raise the melting-point 29deg. F.

tion of about a quarter of an inch of the edge end, which must be kept at its cutting temper without alteration. This can well be done by the creeping method, in several ways. When the shape admits, the edge can be driven into a block of lead a little deeper than the length of the portion to be kept at its existing temper. The lead must be a tight fit, and, if necessary, must be calked around the chisel with a punch. Apply heat to the shank of chisel with a blowlamp, red-hot tongs, iron bar, or any manner that will give sufficient heat to give the blue temper without a pause in the operations, as it will not do to leave off whilst something is being reheated; as if the operation is prolonged too far the block of lead itself may have time to rise in temperature to a point above the temperature of the colour left in the portion of chisel for edge end. The faster the heat is given in this part of the pro-



cess the better. As soon as the blue appears, pour some water on the lead and chisel. Under no circumstances remove the edge from the lead until chisel is nearly cold, or the blue temper will creep farther than it is wanted to.

Another method is to hold the chisel upright by a cramp, with just the edge only immersed in water, and in this case a little less than the whole of the portion of edge end that is to be portected should be immersed, as conduction from the now cold edge will keep the blue from reaching quite to the water. Heat as before directed, and, when the blue appears, drop the whole chisel into the water as before directed. The edge must not be uncovered until the chisel is cold, or the blue may creep too far. (To be Continued.)

Thoughts on Timely Topics

BY THORNTON.

Canstic Censure and Cheery Comment

MET SMITH THE OTHER DAY. You know Smith. Well, Smith hasn't had a vacation in ten years. Hasn't been away from his sooty forge and battered anvil for ten long years. Just think of it—ten long weary years of nothing but pound, pound, on the anvil, and pump, pump, pump at the bellows.—Ten long weary years without a single solitary rest from the continual grind of hard labor. And the shop where Smith works demands his time and hard labor from early morning until late at night. For not only does Smith open shop in the morning, but he stays around after everyone else is gone and 'tends the books, straightens up after the busy day and finally locks up and drags himself home for a few hours sleep. And Smith has been doing just that for ten long years without a single let up. Like a convict condemned to "ten years at hard labor," has Smith been serving in the shop. He has labored and toiled and served. He's never shirked. He's been on time. He's been on the job early, late, always. Yet Smith is working for the same old wages. His boss admits his value. He realizes that the shop cannot run without him; yet Smith works for the same old wage and never has a vacation.

Of course, Smith thinks he is treated unfair. He doesn't think it's just exactly a fair and square deal, but that seems to be as far as it goes. He continues in the same old way. Slaving day after day, week after week and year after year. Same hard, long hours; same small short wages; and the boss doesn't seem to object either. Yet every other man in the shop has had his wages raised, each gets his vacation regularly and yet Smith keeps right on plugging and pounding and slaving. Pretty tough case—isn't he—this man

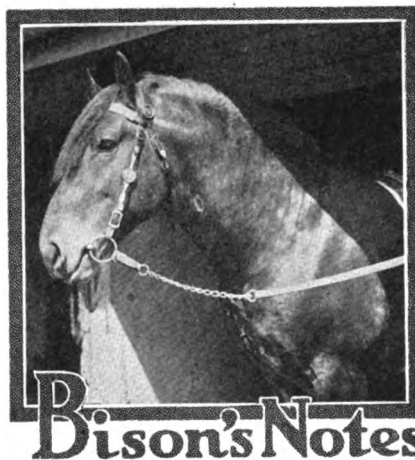
Smith? You'd quit your job wouldn't you? Same as any sensible man. And yet, Smith wouldn't quit for worlds. He has said, time and again that he wouldn't even think of working anywhere else. Says he simply can't.

And it's all because Smith is working for Smith.

And all that we've said about Smith are just a few of the advantages of being boss.

If you are a smith in Smith's class, give yourself a square deal. At least treat yourself as well as you do your other employees.

AUTOMOBILE PROFITS are worth looking into, Brother. And you don't need to take anyone's say so for it. Ask your town garageman or even an auto owner the price of auto oil. Then ask your supply house what they charge per gallon by the barrel. It will surprise you what profit there is in this necessary item. And then do the same on other accessories. Tires, lamps, horns, tire chains and the rest of the auto stuff that you can sell.



The Blood of George Wilkes, 2:22—The Recent Big Sale in New York.

A quarter of a century ago when trotting horse breeders were going crazy over the Wilkes-Mambrino cross, it never occurred to most of the students of breeding to think even of the possibility of the Wilkes blood breeding on in the female line. In those days the phenomenal success which came from mating George Wilkes, 2:22, the horse that only a few years previously had been contemptuously referred to in Kentucky as "Blil Simmons' raced-out pony," with Mambrino mares, started a veritable craze for that combination of blood lines. Sons of George Wilkes, having that cross included, such afterward famous sires as Baron Wilkes, Red Wilkes, Onward, Alcyone, Alcantaron, Guy Wilkes, Simmons, Jay Bird, Wilkes Boy, etc., and breeders paid fabulous prices for stallions having his golden cross. It was only in the male line, however, that most breeders looked for the blood of George Wilkes to breed on. History shows that no other strain of blood has ever bred on in the male line as has the Wilkes blood, but it also shows that it is breeding

on in the female line with the same uniformity as it has in the male line. Recently compiled statistics show that there are thirty-one stallions whose daughters have produced four or more 2:10 trotters. Thirteen of these, including the one whose daughters have produced the largest number of trotters in this extreme speed list are descended from George Wilkes in the direct male line, the total number of such trotters to the credit of these Wilkes sires being ninety-three. To everyone engaged in the entrancing recreation which breeding trotters is to every enthusiast, the list of these Wilkes sires whose daughters have overturned breeding theories which once prevailed, will be of much interest. These Wilkes sires and the 2:10 trotters produced by their daughters, with the sire of each of these trotters follows:

Baron Wilkes, 2:18, son of George Wilkes:—Lord Dewey, 2:03¾, by Admiral Dewey, 2:04¾; Don Chenault (3), 2:05¾, by Peter O'Donna, 2:08; Lady Gail Hamilton, 2:06¾, by Oakland Baron, 2:09¾; Sister Spier, 2:07, by Directum Spier, 2:11¼; Alceste, 2:07¾, by Jay Bird; Peter Billikin, 2:07¾, by Peter The Great, 2:07¾; Ruth McGregor, 2:07¾, by Jay McGregor, 2:07¾; Jim Todd, 2:08¾, by Todd, 2:14¾; Justo, 2:08¾, by Jay Bird; Arona McKinney, 2:08¾, by McKinney, 2:11¼; Thistle Doune, 2:09¾, by Jerry McGregor, 2:07¾; Barney Gibbs, 2:09¾, by Prodigal, 2:16; Host Peter, 2:10, by Peter The Great, 2:07¾; Lady Wanetka (2), by Peter The Great, 2:07¾.

Wilton, 2:19¾, son of George Wilkes:—Shawbay, 2:05¾, by Silent Brook, 2:16½; Sienna, 2:06¾, by Peter The Great, 2:07¾; Manrico (3), 2:07¾, by Moko; Zarrine, 2:07¾, by Silent Brook, 2:16½; The Plunger, 2:07½, by The Bondsman; Gayton, 2:08¾, by Allerton, 2:09¾; Peter W., 2:08¾, by Peter The Great, 2:07¾; Brighton, 2:08¾, by Moko; Dorothy Redmond, 2:09, by Director, 2:17; Lord Brussels, 2:09½, by Axworthy, 2:15½; Eleanor G., 2:10, by Silent Brook, 2:16½.

Axtell, 2:12, grandson of George Wilkes:—Mainsheet, 2:05, by The Director General; Margaret O., 2:05¾, by Onward, 2:25¾; Lettie Lee, 2:06¾, by Moko; Chase, 2:07¾, by Keeler, 2:13¾; Exall, 2:08¾, by Exalted, 2:09¾; George Muscovite, 2:08¾, by Muscovite, 2:18; Great Governor, 2:08½, by Peter The Great, 2:07¾; Madden, 2:09¾, by Peter The Great, 2:07¾; Mightellion, 2:09¾, by Mighty Onward, 2:22½; Morine, 2:09¾, by Mobel, 2:10¾.

Guy Wilkes, 2:15¾, son of George Wilkes:—Esther W., 2:06¾, by Director Moore's First, 2:22½; Peter Thompson (3), 2:07½, by Peter The Great, 2:07¾; Guy Axworthy, 2:08¾, by Axworthy, 2:15½; Miss Stokes, (3) 2:08¾, by Peter The Great, 2:07¾; F. S. Whitney, 2:09¾, by F. S. Turner, 2:24; Eva Tanguay, 2:09¾, by Peter The Great, 2:07¾; The Pierette (3), 2:09¾, by Peter The Great, 2:07¾; Harry Dillon, 2:10, by Sidney Dillon.

Moko, grandson of George Wilkes:—The Harvester, 2:01, by Walnut Hall, 2:08¾; O'Neil, 2:07¾, by Walnut Hall, 2:08¾; Martha Tipton, 2:09¾, by Walnut Hall, 2:08¾; Vito, 2:09½, by Prodigal, 2:16; Northspur, (3) 2:09¾, by San Francisco, 2:07¾; Lettie Hall, 2:10, by Walnut Hall, 2:08¾; Moko Hall, 2:10, by Walnut Hall, 2:08¾.

Onward, 2:25¾, son of George Wilkes:



—Grace, 2:04¾, by Peter The Great, 2:07¾; Ario Leyburn, 2:07¾, by Arion, 2:07¾; Czarevna (3), 2:07¾, by Peter The Great, 2:07¾; Farra, 2:08¾, by Bernadotte, 2:29½; Crystallion, 2:08¾, by Arion, 2:07¾; Dago, 2:09, by Gen. Forrest, 2:08; Idora, 2:09¾, by Elyria, 2:25¼.

Alcantara, 2:23, son of George Wilkes:—Gazeta, 2:06, by Admiral Dewey, 2:04¾; Willgo, 2:07¾, by Togo, 2:27; Lake Queen, 2:08¾, by Red Lake, 2:15¾; Direct Tone, 2:09¾, by Directum Kelley, 2:08¾; Early Reaper, 2:09¾, by High-

2:10¾; Remorseful, 2:08¾, by Wiggins, 2:19½; Medium Line, 2:10, by Red Medium, 2:23¾.

Allerton, 2:09¾, grandson of George Wilkes:—Alice Arion, 2:08¾, by Arion, 2:07¾; Kenyon W., 2:08¾, by Marcos Bozzans, 2:21; Deloree, 2:09¾, by Delmarch, 2:11½; Ann Direct, 2:10, by Direct J., 2:05½; Captain Cadada, 2:10, by The Captain, 2:20¾.

Moquette, 2:10, grandson of George Wilkes:—Lassie McGregor, 2:06¾, by Jerry McGregor, 2:07¾; Linden Hall,

Wilkes Boy, 2:24½, son of George Wilkes:—Spanish Queen, 2:04¾, by Onward Silver, 2:05¾; Lizzie Brown, 2:05¾, by The Bondsman; Lou Jennings, 2:06¾, by Todd, 2:14¾; Electric Todd, 2:09½, by Todd, 2:14¾.

Not in many years has anything occurred so encouraging to the trotting horse breeding interests as some of the patrons of the recent big sale in New York City presented. In the first place, the sale was the largest that has been held in a long time, over seven hundred horses passing under the hammer during the sale. Of course, as has always been the case—and probably always will be—there were a number of the offerings that went very cheap, mostly unfitted colts, many of them unbroken and unable to show anything. In New York offerings of that sort always go for little money, but executors of estates seem to think New York is the only place to sell horses and consequently they continue to send green, unbroken, unfitted colts there and continue to get less money for them than they could have gotten for them right at home. And, as a rule these cheap colts contain a pretty fair proportion of real good race prospects that turn out well later on and demonstrate the wisdom of the judgment that resulted in their purchase. The well-bred, well-fitted horses sold at New York this fall, however, brought prices that gave breeders the most encouragement they have found at an auction sale in some years. For instance, a Virginia breeding farm, which is headed by the champion trotting stallion, The Harvester, 2:01, sent to this sale seventeen weanlings, colts and fillies by the great stallion that ranged in age from four to six months and the average price these baby brothers brought was slightly in excess of \$300 each. This was an innovation in the New York sale business, no other breeder having ventured to send his weanlings into the sale ring. These sons and daughters of The Harvester, however, were grandly bred, were in the pink of condition and were all entered in the big futurity purses. Another breeder, a Kentuckian, sent seven highly developed yearling colts and fillies into the ring and received for them \$9,385, an average of \$1,340 each. These youngsters were all by one sire, and one of them brought \$3,425, the highest price paid for a yearling in Madison Square Garden in eighteen years. Another yearling in another consignment brought \$2,250, while a great many brought from \$500 to \$1,000 each. Many breeders added mares to their bands of brood mares, one paying \$7,500 for Margaret Druven, 2:03¾, which was the highest price of the sale. The same breeder paid \$2,000 each for The Abbess, 2:03¾, daughter of the Abbe, 2:04, and the same amount for Little Lee, 2:06¾, daughter of Moko. This breeder was C. K. G. Billings, of Virginia, and he also bought Poinsetta, 2:14¾, by Barringale; Berta Bellim, 2:15, by Bellim; Baroness Setzer, 2:15¾, by Henry Setzer and several others, paying from \$600 to \$1,500 each for them. While the sale was marked by the absence of the foreign buyers who during the past few years have bought most of the fast stallions offered in the New York sales. Stallions with breeding and speed sold well, nearly half a score of the best ones being purchased by Canadian buyers at good prices and many of the well bred mares also went to Canadian buyers.



AN ENTRANCE GATE OF THE SEVENTEEN CENTURY IN LIEGE, BELGIUM

wood, 2:21½; Farfalla, 2:09¾, by Bel-
lim, 2:13¼.

Ashland Wilkes, 2:17¾, grandson of George Wilkes:—Dan Halle, 2:06¾, by Peter The Great, 2:07¾; Binland (3), 2:08¾, by Binjolla, 2:17¾; Mainleaf (3), 2:08¾, by Mainsheet, 2:05; Grace Bond (3), 2:09¾, by The Bondsman; Ruby Clay, 2:09¾, by C. F. Clay, 2:18; Binville, 2:10, by Binjolla, 2:17¾.

Simmons, 2:28, by George Wilkes, 2:22:—Hamburg Belle, 2:01¾, by Axworthy, 2:15½; Fereno, 2:05½, by Moko; Lewis Forrest, 2:06¾, by Gen. Forrest, 2:08; Spriggan, 2:08¾, by Baron McKinney,

2:08, by Arion, 2:07¾; Doctor Treg, 2:08¾, by Fregantle, 2:09¾; R. F. V., 2:10, by Jay McGregor, 2:07¾.

Nutwood Wilkes, 2:16¾, grandson of George Wilkes:—San Francisco, 2:07¾, by Zombro, 2:11; Lady Mowrey, 2:09¾, by McKinney, 2:11¾; Redeem, 2:09¾, by Directum II; Dan McKinney, 2:10, by Kinney Lou, 2:07¾.

Red Wilkes, son of George Wilkes:—Gay Audubon, 2:06¾, by Audubon Boy P., 1:59¾; Pewitt, 2:08¾, by Cecilian, 2:22; Walnut Hall, 2:08¾, by Conductor, 2:14¾; Kingmond, 2:09, by King Darlington, 2:10.



The Helpers

W. O. B.

(After Kipling's "The Ladies" and F. P. A.'s "The Servants")

We've taken our help where we found 'em;

We've answered many an ad;
We've had our pickin' o' helpers,
And most of the lot was bad.

Some was Billys' an' Ottos';
Willie he came last fall,
Joes' and Jims' and Louies' and Tims',
And now we've got none at all.

Now we don't know much about helpers,
For, takin' 'em all along,
You never can tell 'till you've tried 'em,
And then you are like' to be wrong.
There's times when you'll think they're perfect;

There's times when you'll think they're bum,
But the things you'll learn from those
that have gone

May help you with those to come.

Michael, he landed from Dublin,
Green as acushla machree;
Otto was willing and anxious
To learn what a helper should be.
We told Sam Kirk all about him—
He offered Ott. somewhat more tin—
Now Otto he works, as you know—down
at Kirk's—
And we learned about helpers from him.

Louie, we got from the Fatherland:
Louie was saving and Dutch—
Thought that our ways were expensive,
And told us we spent far too much.
Louie decamped with our wallet
When it was not all slim—
He was willing and kind with a Socialist
mind
And we learned about helpers from him.

Sambo blew in from the Indies,
Black as the middle of night—
Worked like a regular Trojan—
Kept shop shiny an' bright.
Everything ran along smoothly
Until—We got it from Jim—
He eloped with a maid who was black as
a spade
But we learned about helpers from him.

We've taken our help as we've found 'em,
Yellow and black and white;
Some were better than others,
But none of the lot was right.
And the end of it's only worry
And trouble and bother and fuss.
When you answer an ad, think of those
we have had
And learn about helpers from us.

Keep constantly and persistently at the heels of your debtors. Many a failure can be laid to inattention to collections. Don't let this be your trouble.

Let your customers know that you are in business for money, but don't let them get the idea that you are out for the money under pirate rules.

Some folks, like Tom Tardy, think that dozing is the same as thinking, when if they saw some real thinker at work thinking thy'd find it to be real hard blood-sweating work.

It is the repeating of mistakes that places us in the wise or foolish class. Everyone makes mistakes but it is not merely the making of them alone that concerns us most.

Can you look ten years ahead? What do you think the smith shop of 1926 will be like? Changes are bound to take place—are taking place right now—what do you think the results will be?

There are two kinds of booze combatants—those that "war on booze," and those that "fight booze." And there is a big difference despite the fact that "war" and "fight" may be synonymous.

Ask the man who does not read a trade journal how he would know about oxy-acetylene welding and cutting machines if it were not for the craft papers. Also turn this over in your own mind, Mr. Reader.

You get behind when you allow a bill to run so long as to let a customer get behind. Make your customer catch up so that you can catch up. Careful and continuous attention to charge accounts is necessary.

Of course you are not supposed to know all about a new machine the minute it comes into the shop. The manufacturers are glad, however, to give you every assistance and to explain to you anything you do not understand.

More and more difficult each month is it becoming to put your name on "Our Honor Roll." Better sharpen your pencil and figure out how you can get on that list now. The sooner you make an effort the

easier you will find it.

If you feel that your end of the selling price is too big, by all means cut your prices, but remember when you cut at the selling end, it's the profit and not the cost that you cut into. A cutting of expenses increases profits.

Smithing is lots easier these days. There is no excuse for not having modern machines in your shop. Just look through this issue of "Our Journal" and notice the many labor saving machines that you can place in your shop at small cost.

Do as your grandfather did. He no doubt used the most approved methods and tools of his time. Use the best methods and tools of your time. Don't use old time tools for old time's sake. Your granddaddy didn't do it, so why should you?

What do you prefer? To be a good business man and a poor smith or a good smith and a poor business man? Needless to say which you should be and moreover can be. Doesn't reading "Our Journal" make you a better balanced craftsman?

Are you feeding the profits of one department of your business to keep another fat? Careful accounting in every department will show you where you stand and will prevent the feeding of one department at the expenses of another.

While you are bemoaning your lack of foresight and saying, "If I had only started ten years ago." Remember that ten years from now folks will be saying the same thing. Now is the time to get started. Think of this when you are considering the opportunities in the automobile repair field.

Take a lesson from the bootblack. He usually announces his wares when he sees there is need of his services. Keep your finger on the pulse of your customer's wants and when you see a need for any one of the many things that you can supply, do not hesitate to suggest your furnishing the necessary services.

When you find yourself saying, "I haven't time" just remember that you will never have any more time than you have right now. We have and we have always had all the time there is—24 golden hours every day. It is not so much a question of time, but the use we make of it. Let your thoughts dwell on that for a little time.

"What's this I hear about welding and cutting steel with gas and a hollow rod?" questioned Tom Tardy the other day. We explained the principals of oxy-acetylene welding to him midst his exclamations of surprise and wonder and we couldn't help thinking that our friend was somewhat behind the time simply because he didn't read a craft paper.

Would you attempt to run a race if you were blind-folded? Some smiths try to run their business without paying any attention to running expenses and cost and then they wonder why they don't win. Eyes open and carefully kept books will show you just where you are running your business, whether into the ditch of failure or on the road to success.

How long will it take you to write a short item for publication in this paper? Your brother smiths can learn from your experience just as you are learning from theirs. Sit right down now and write us a description of that odd job you did recently. Tell American Blacksmith readers how you succeeded in solving a particularly puzzling problem. They'll be glad to know about it.



Heats, Sparks, Welds

Fatten your purse by shortening credits.

Your customers—are they satisfied or must they be pacified?

As easy to quench fire with gasoline as to drown troubles in drink.

No ambition? Why, even the tramp is ambitious—to live without work.

Do others believe in you? Perhaps if you believed in yourself others would.

When a smith says he is sorry he ever learned the smithing trade, is the trouble with the man or the trade?

Price certainly does appeal to the purse, but the re-orders depend upon quality. Are you looking for first orders only?

The usual time for the fire is just after the policy has lapsed. Keep a sharp eye on the date of your insurance contract.

Are you looking after your equipment properly? Remember that actual use will not wear out tools any quicker than lack of care.

Unless the curtain drops in several of the theatres over across the pond pretty soon the next European census will show a pretty slim 'house'.



Our Honor Roll

FORTY-NINE NEW NAMES

Just 49 new names have been placed on this month's Honor Roll. Forty-nine new subscribers have paid up to or beyond December, 1915. And of these 49 new Honor Roll readers 19 have paid their subscriptions up to or beyond 1920—19 have each made a saving of two or more dollars on their subscriptions. If the saving per subscriber averages two dollars for the entire 49 it means that Our Long-Time Rates have saved "Our Folks" just ninety-eight dollars this past month. Why don't you get some of that saving? Why not look over the long-time rates and pick out a saving rate that will fit your future? Think it over, Mr. Reader—insure your subscription at the lowest possible rate.

	U. S. and Mexico	Canada	Other Countries
2 yrs.	\$1.60 save \$.40	\$2.00 save \$.50	10 sh. save 2 sh.
3 yrs.	2.00 save 1.00	2.70 save 1.05	14 sh. save 4 sh.
4 yrs.	2.50 save 1.50	3.20 save 1.80	18 sh. save 6 sh.
10 yrs.	5.00 save 5.00	7.00 save 5.50	1£ 14 sh. save 1£ 6 sh.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no better time than NOW.

NAME	Subscription Paid to	NAME	Subscription Paid to
The Fix-It Shop, Utah.....	July, 1915	J. Spratt, Mass.....	Nov., 1923
J. A. Torrey, Mass.....	Dec., 1915	F. Watkins, N. H.....	Nov., 1923
W. C. Watts, Kansas.....	Dec., 1915	F. Koppins, Ala.....	Nov., 1923
I. J. Stitt, N. J.....	Jan., 1919	Y. C. Llenert, S. Australia.....	Oct., 1923
Waddington Farm, W. Va.....	Mar., 1923	W. R. Abell, N. Y.....	Oct., 1923
A. A. MacLean, Nev.....	Feb., 1927	W. R. Turner, Man.....	Oct., 1923
John H. W. Schneider, Cal.....	Dec., 1926	C. Nelson, Nebr.....	Sept., 1923
J. Taylor, Calif.....	Oct., 1926	H. M. Anderfuren, Calif.....	Aug., 1923
O. Temple, Idaho.....	Jan., 1926	Camp Bros., Texas.....	Aug., 1923
N. Karolewicz, S. Dak.....	Jan., 1926	L. C. Larsen, Iowa.....	July, 1923
E. L. Lain, N. Y.....	Dec., 1925	S. Effenaar, S. Africa.....	July, 1923
J. A. Hulvey, Ill.....	Dec., 1925	G. L. DeWitt, Mont.....	July, 1923
A. W. Speir, Ohio.....	Nov., 1925	W. W. Gregg, Texas.....	July, 1923
W. R. Clepper, Texas.....	Nov., 1925	W. R. Stroupe, N. C.....	July, 1923
G. H. Isley, Mass.....	Nov., 1925	O. C. Young, Mich.....	June, 1923
Reynolds Bros., Penna.....	Sept., 1925	Otto Sippel, Penna.....	June, 1923
F. W. Krens, Calif.....	Aug., 1925	A. Chapman, N. Y.....	June, 1923
C. E. Allen, Nebr.....	Aug., 1925	C. Birely, Md.....	June, 1923
A. E. Spangberg, Oregon.....	May, 1925	F. H. Shupe, Penna.....	June, 1923
D. M. Kille, Okla.....	Apr., 1925	J. C. Stover, Penna.....	Apr., 1923
G. Gullgren, Iowa.....	Apr., 1925	W. Schoonover, Penna.....	Apr., 1923
G. Frericks, Minn.....	Mar., 1925	J. M. Rumble, Iowa.....	May, 1923
V. Priessnitz, Wisc.....	Mar., 1925	Lownsdale Bros., Mo.....	Mar., 1923
E. Price, Ill.....	Feb., 1925	J. Carswell, Ark.....	Mar., 1923
D. C. Garber, Ohio.....	Feb., 1925	G. E. Glazier, Ohio.....	Mar., 1923
J. H. Kurk, Ill.....	Feb., 1925	G. Fath & Co., S. Africa.....	Mar., 1923
E. R. Hiteshue, Ohio.....	Feb., 1925	T. Bradley, N. S. Wales.....	Mar., 1923
H. F. Schreiber, Penna.....	Feb., 1925	L. T. Needham, Ill.....	Feb., 1923
C. M. Adams, Conn.....	Jan., 1925	G. C. Disinger, Miss.....	Feb., 1923
J. S. Damm, Iowa.....	Jan., 1925	J. Hughes, Ohio.....	Feb., 1923
J. M. Withers, Hawaii.....	Jan., 1925	J. Wieber, Minn.....	Jan., 1923
F. H. Jarvis, Ind.....	Dec., 1924	Z. A. Enos, Minn.....	Jan., 1923
Geo. Tatum, Jr., Fla.....	Dec., 1924	W. G. Wise, Calif.....	Jan., 1923
I. Clark, Va.....	Dec., 1924	F. S. Elishop, S. Africa.....	Jan., 1923
A. N. Estes, Va.....	Dec., 1924	J. Curran, Ariz.....	Jan., 1923
J. Bailey, Man.....	Dec., 1924	S. P. Harney, Mont.....	Dec., 1922
E. G. Naylor, Md.....	Dec., 1924	W. Breckner, Okla.....	Dec., 1922
Halvorson Brothers, S. D.....	Nov., 1924	J. Pabina, Neb.....	Dec., 1922
P. Schlick, Wash.....	Nov., 1924	P. Frederickson, Iowa.....	Nov., 1922
H. E. Snyder, Ore.....	Nov., 1924	L. O. Leturs, Ill.....	Nov., 1922
J. A. Stewart, Ky.....	Oct., 1924	W. Lawson, N. Zealand.....	Nov., 1922
C. Richenecker, N. Y.....	Oct., 1924	W. O. Grant, Cal.....	Oct., 1922
W. L. Bertholf, N. J.....	Oct., 1924	W. H. Miller, Iowa.....	Oct., 1922
J. W. Hewson, S. Africa.....	Sept., 1924	A. O. Martin, Idaho.....	Sept., 1922
Ed. Larson, N. D.....	Sept., 1924	O. A. Mortimer, Idaho.....	Sept., 1922
R. T. Monk, Ill.....	Sept., 1924	H. J. Hyatt, Wash.....	Sept., 1922
W. T. De Young, Ill.....	Sept., 1924	J. N. Skow, Iowa.....	Sept., 1922
Charles Wells, Colo.....	Aug., 1924	A. D. Standiford, Wash.....	Sept., 1922
H. G. Weaver, Penna.....	Aug., 1924	T. Temkiewicz, Que.....	Sept., 1922
Working Men's College, Viet.....	June, 1924	A. Peliffer, Ohio.....	Aug., 1922
F. M. Kenoyer, Nebr.....	June, 1924	W. D. Valentine, Iowa.....	Aug., 1922
R. C. Frederick, N. D.....	May, 1924	G. Hoffman, N. Y.....	July, 1922
H. L. Fenton, N. Mexico.....	May, 1924	J. Erman, Ark.....	July, 1922
J. Carl, Iowa.....	May, 1924	W. K. W. Hansen, Penn.....	June, 1922
J. E. Little, Penna.....	May, 1924	Robert Tochter, Cal.....	June, 1922
H. I. Brenzel, N. Y.....	Apr., 1924	J. Van Marter, N. Y.....	June, 1922
W. E. Parr, Iowa.....	Apr., 1924	F. Norrie, Yukon Ty.....	Jan., 1922
F. Sramek, Nebr.....	Apr., 1924	E. Anders & Son, S. Australia.....	May, 1922
L. A. Hulen, Calif.....	Apr., 1924	Louisa Carriage Wks., Va.....	May, 1922
J. E. Ray, Minn.....	Mar., 1924	S. Smith, Tex.....	Apr., 1922
A. Hulstrand, N. D.....	Mar., 1924	J. W. Haar, La.....	Mar., 1922
W. F. Riske, Wis.....	Mar., 1924	D. W. Smith, La.....	Mar., 1922
B. F. Seibert, Calif.....	Mar., 1924	D. W. Smith, R. I.....	Mar., 1922
H. Roeschwetter, Mo.....	Mar., 1924	E. A. Dillon, Nev.....	Mar., 1922
W. B. Briant, N. J.....	Mar., 1924	D. F. Kuster, Wash.....	Mar., 1922
A. Bosch, N. Y.....	Mar., 1924	G. F. Johnson, Mich.....	Feb., 1922
A. R. Johnson, R. I.....	Feb., 1924	R. H. Keith, Iowa.....	Jan., 1922
F. Jacobs, Ohio.....	Feb., 1924	J. B. Scheidler, Ind.....	Dec., 1921
A. J. Ferry, Ill.....	Jan., 1924	J. H. Ickes, Penn.....	Dec., 1921
E. G. Walker, Calif.....	Jan., 1924	E. Willis, Colo.....	Dec., 1921
H. D. Erskine, Vt.....	Jan., 1924	O. M. Johnson, Minn.....	Oct., 1921
E. Fowler, Penna.....	Jan., 1924	H. Feldus, N. be.....	Sept., 1921
Breen & Son, Ireland.....	Dec., 1923	A. S. Pratt, New York.....	July, 1921
M. Lamoreaux, Ohio.....	Dec., 1923	W. F. Kline, Kansas.....	May, 1921
C. R. Davis, N. Y.....	Dec., 1923	E. Mossner, Queens, Australia.....	Apr., 1921
F. W. Copeland, Kansas.....	Dec., 1923	E. Slee, N. Y.....	Feb., 1921
J. L. Tomlin, Kansas.....	Dec., 1923	G. L. Jester, Mo.....	Jan., 1921
H. A. Davis, N. Y.....	Dec., 1923	J. A. Moffatt, Yukon Ty.....	Jan., 1921
E. H. Troyke, Ill.....	Dec., 1923	O. A. Huff, Penn.....	Dec., 1920
D. B. Johnson, Iowa.....	Dec., 1923	J. T. Rowe, Iowa.....	Dec., 1920
B. Horton, Calif.....	Nov., 1923	W. Parsons, Ont.....	Dec., 1920

NAME	Subscription Paid to	NAME	Subscription Paid to
Eisler Bros., S. Dak.....	Dec., 1920	Wright, Boag & Co., S. Africa	June, 1919
J. Krahulec, Ill.....	Dec., 1920	F. Rass, Sask.....	June, 1919
L. F. Kellholz, Penna.....	Dec., 1920	W. H. Hooper, Cal.....	June, 1919
F. Margraf, Minn.....	Dec., 1920	G. Jackson, England.....	June, 1919
S. Wright, N. Y.....	Dec., 1920	E. G. Mulholland, Me.....	June, 1919
T. P. Consodine, Mass.....	Dec., 1920	Vinsten & Duncan, S. Africa.....	June, 1919
H. C. Strine, Penna.....	Nov., 1920	W. F. Helmege, Tex.....	May, 1919
C. M. McNutt, Mass.....	Nov., 1920	J. W. Delmore, Nev.....	May, 1919
J. M. Mapes, New York.....	Nov., 1920	C. H. McCormack, Kansas.....	May, 1919
W. Condon, New York.....	Nov., 1920	M. Duboise, Miss.....	May, 1919
F. Strieff, Wisc.....	Nov., 1920	W. Parker, Man, Canada.....	May, 1919
L. P. Mortensen, Mich.....	Nov., 1920	Bjork Brothers, S. Dak.....	Apr., 1919
A. W. Brennehan, Ind.....	Nov., 1920	Ale Pederson, Minn.....	Apr., 1919
Thomas Scurr, New Zealand.....	Oct., 1920	R. Manake, Tex.....	Apr., 1919
W. H. Finlay, New Zealand.....	Oct., 1920	Clyde Engineering Co., N.S.W.....	Apr., 1919
R. D. Simkins, Penna.....	Sept., 1920	A. Thompson, Fiji Islands.....	Apr., 1919
L. B. Garvin, Ohio.....	Sept., 1920	Theo. Paschke, Nebr.....	Apr., 1919
A. E. Reeve, Mass.....	Sept., 1920	I. M. Townsend, Calif.....	Apr., 1919
F. A. Poole, South Africa.....	July, 1920	G. Bish, Fiji Islands.....	Apr., 1919
C. Gibson, Ill.....	July, 1920	G. D. Gamble, Mass.....	Apr., 1919
H. M. Whitman, Neb.....	July, 1920	G. Ingram, Va.....	Apr., 1919
The Goldfield Diamond Drilling Co., Victoria, Australia.....	July, 1920	J. H. Martin Mfg. Co., Ind.....	Apr., 1919
G. M. Robben, Kans.....	July, 1920	R. H. Kuhrt, Iowa.....	Apr., 1919
R. J. J. Rees, S. Australia.....	July, 1920	J. Moyer, S. D.....	Apr., 1919
W. L. Patterson, Okla.....	June, 1920	C. N. Anderson, Ark.....	Apr., 1919
D. Hardy, Viet.....	June, 1920	A. Frizick, Mass.....	Mar., 1919
E. Malpas, S. Australia.....	June, 1920	R. A. Bass, La.....	Mar., 1919
A. J. Hamburg, Ohio.....	June, 1920	S. M. Torrence, Ohio.....	Mar., 1919
C. M. Holton, Okla.....	June, 1920	A. J. Holmquist, Iowa.....	Mar., 1919
C. L. Graf, Ohio.....	June, 1920	Emil Halum, Minn.....	Mar., 1919
A. Mellum, N. D.....	June, 1920	G. N. Follmar, Nebr.....	Mar., 1919
P. Wright, Calif.....	May, 1920	C. J. Vonblad, Penn.....	Mar., 1919
F. Greer, Queens.....	Apr., 1920	F. Weber, Tasmania.....	Mar., 1919
C. L. Morgan, N. Y.....	Apr., 1920	Wyper Bros., Queens.....	Mar., 1919
Alex. Zimmer, Ont.....	Apr., 1920	A. Rogers, N. Y.....	Mar., 1919
Clark Bros., Cal.....	Mar., 1920	P. W. Fossett, Me.....	Mar., 1919
W. H. Leonard, Penn.....	Mar., 1920	C. Hubman, Colo.....	Mar., 1919
Ed. Grimm, Tex.....	Mar., 1920	Onondaga Forge Co., N. Y.....	Mar., 1919
H. L. Place, S. Australia.....	Mar., 1920	A. F. Bowman, Ohio.....	Mar., 1919
J. Hiernsey, Minn.....	Mar., 1920	C. Williams, W. Australia.....	Mar., 1919
G. S. Akers, Va.....	Mar., 1920	J. P. Mackin, N. D.....	Mar., 1919
J. F. Lelas, N. J.....	Feb., 1920	E. Raeta, Kansas.....	Mar., 1919
C. M. Jacobsen, Utah.....	Feb., 1920	A. Burke, N. J.....	Mar., 1919
P. Bianchi, Texas.....	Jan., 1920	J. W. Hepplewhite, Ohio.....	Feb., 1919
R. S. Crisler, Ky.....	Jan., 1920	Fanslow Brothers, S. D.....	Feb., 1919
T. A. Mahar, Me.....	Jan., 1920	John Meyn, Illinois.....	Feb., 1919
T. Horne, Ariz.....	Jan., 1920	D. Frazer, N. Zealand.....	Feb., 1919
H. B. Draper, Ind.....	Jan., 1920	C. W. M. Burroughs, N. J.....	Feb., 1919
H. H. Schoob, Wyo.....	Jan., 1920	C. T. Haskins, N. Y.....	Feb., 1919
L. A. Coats, Mont.....	Jan., 1920	N. E. Koch, Cal.....	Feb., 1919
I. Blough, Penna.....	Feb., 1920	L. Artzner, Ohio.....	Feb., 1919
H. Kraft, Calif.....	Dec., 1919	R. Taylor, N. Zealand.....	Feb., 1919
Dayable & Sons, Viet.....	Dec., 1919	R. Strude, Ore.....	Feb., 1919
E. M. Crouch, Conn.....	Dec., 1919	Lehnain Bros., Ill.....	Feb., 1919
R. Werk, Nebr.....	Dec., 1919	W. J. Andrews, Ark.....	Feb., 1919
J. R. Wilson, Md.....	Dec., 1919	O. N. Benninger, Penn.....	Feb., 1919
N. Buchanan, Ont.....	Dec., 1919	C. L. Crossen, Ill.....	Feb., 1919
P. Relf, Ohio.....	Dec., 1919	H. G. Sebasta, South Dakota.....	Jan., 1919
A. Larsen, Ida.....	Dec., 1919	W. Harsenape, S. Africa.....	Jan., 1919
H. Andersen, Iowa.....	Dec., 1919	J. A. Bergerholm, Cal.....	Jan., 1919
I. F. Powers, N. J.....	Dec., 1919	L. A. Telking, Kansas.....	Jan., 1919
J. G. Grundlund, Conn.....	Dec., 1919	W. S. Wagner, Texas.....	Jan., 1919
J. B. Horn, N. Mexico.....	Dec., 1919	A. Mackenzie, W. Australia.....	Jan., 1919
A. J. Haun, Calif.....	Dec., 1919	H. A. Witherow, Penna.....	Dec., 1918
A. Clark, Viet.....	Dec., 1919	L. C. Blanchard, Mass.....	Dec., 1918
O. J. Wilson, N. H.....	Dec., 1919	Geo. Bummel, Mich.....	Dec., 1918
Booth, MacDonald & Co., N. J.....	Dec., 1919	J. M. Schmitt, Minn.....	Dec., 1918
A. Luke, Nebr.....	Dec., 1919	W. Kline, Mass.....	Dec., 1918
F. W. Rupp, Wisc.....	Dec., 1919	Suefjohn & Seefeld, Wisc.....	Dec., 1918
J. G. Kmg, N. Y.....	Dec., 1919	C. F. Vandre, New York.....	Dec., 1918
J. B. Beaudet, Quebec.....	Nov., 1919	E. T. Evans, New York.....	Dec., 1918
W. Vallance, N. Y.....	Nov., 1919	M. Rogler, N. H.....	Dec., 1918
W. Schaid, Wisc.....	Nov., 1919	C. W. Burger, Ind.....	Dec., 1918
J. Delane, Nebr.....	Nov., 1919	John E. Lank, Penna.....	Dec., 1918
P. Gudmunson, S. Dakota.....	Nov., 1919	F. W. Perry, New York.....	Dec., 1918
R. Ramach, N. W. Ter.....	Nov., 1919	F. S. Sandy, W. Va.....	Dec., 1918
J. Naismith, N. Zealand.....	Nov., 1919	F. W. Lyons, Calif.....	Dec., 1918
W. H. Lick, Ohio.....	Nov., 1919	Public Library, Ohio.....	Dec., 1918
W. N. Shofield, Mo.....	Oct., 1919	H. Noffinger, Iowa.....	Dec., 1918
W. H. Spicer, Ky.....	Oct., 1919	George Springer, La.....	Dec., 1918
O. Bourgon, Que.....	Oct., 1919	Fred Riewe, Texas.....	Dec., 1918
T. Russell, N. S. Wales.....	Oct., 1919	T. T. Mathieson, Calif.....	Dec., 1918
J. Alston, Viet.....	Oct., 1919	Fred Goette, Idaho.....	Dec., 1918
J. P. Jones, Col.....	Sept., 1919	W. P. McWilliams, Colo.....	Dec., 1918
A. F. Stickel, N. Y.....	Sept., 1919	W. Martinek, Mo.....	Dec., 1918
A. E. Reeve, Mass.....	Sept., 1919	I. E. Saunders, Mass.....	Dec., 1918
T. B. Smart, Mo.....	Sept., 1919	M. Mackh, N. Y.....	Dec., 1918
Schmitt Bros., Ill.....	Sept., 1919	R. F. Randall, Mass.....	Dec., 1918
W. Clark, S. Africa.....	Sept., 1919	L. Chartier, Conn.....	Dec., 1918
W. R. Randall, N. J.....	Sept., 1919	P. E. Dahlquist, Calif.....	Dec., 1918
M. Pople, N. S. W.....	Sept., 1919	C. Phinacey, N. Y.....	Dec., 1918
W. H. Sheaffer, Penn.....	Sept., 1919	E. B. Storey, Miss.....	Dec., 1918
H. L. Lyon, By.....	Aug., 1919	J. Jensen, Wisc.....	Dec., 1918
R. Cresswell, N. Zealand.....	Aug., 1919	W. B. Jones, Indiana.....	Dec., 1918
W. E. Sheets, Penn.....	Aug., 1919	E. E. Roberts, Indiana.....	Dec., 1918
Harnes Bros, Mo.....	Aug., 1919	M. Gus Thomas, Hawaii.....	Dec., 1918
Cooper & Curd, N. Zealand.....	Aug., 1919	J. L. Giesler, Texas.....	Dec., 1918
A. Discher, N. Queens.....	Aug., 1919	Peter Miller, Nebr.....	Dec., 1918
E. Underwood, S. Africa.....	Aug., 1919	F. Cluska, Md.....	Dec., 1918
E. P. Wambold, Penn.....	Aug., 1919	M. Beck, New York.....	Dec., 1918
W. F. Turner, S. Australia.....	Aug., 1919	B. R. Merritt, Queens.....	Dec., 1918
C. H. Smith, S. Australia.....	July, 1919	Brown & Scully, N. S. Wales.....	Dec., 1918
W. Lettetter, Ark.....	July, 1919	A. Horstad, Minn.....	Dec., 1918
J. P. Dambach, N. J.....	July, 1919	E. P. Howes, Mass.....	Dec., 1918
J. T. Wilson, S. C.....	July, 1919	C. N. Robinson, Vermont.....	Dec., 1918
J. A. Moffett, Penn.....	July, 1919	G. F. Trelogan, N. J.....	Dec., 1918
J. C. Jacobson, Wyo.....	June, 1919	F. Vincent, N. Y.....	Dec., 1918
W. Perrow, South Africa.....	June, 1919	J. R. Conrad, Kansas.....	Dec., 1918
I. B. Harey, Cal.....	June, 1919	A. O. Giroux, Mass.....	Dec., 1918
		A. A. Murray, Texas.....	Dec., 1918



A Lurette Grille in Wrought Iron

ARTHUR W. JORDAN.

The lurette grille shown in the accompanying illustrations was made for an aristocratic mansion in the West End of London, and was designed by the writer who superintended the making of it.

In considering both its design and structure it is necessary to remember the purpose it was to serve. In the first place it was desired simply to form an ornamental fill-up to an arch over an opening at the side of

character heavy forging, or welding was quite avoided. The size was six feet by three feet and a sense of proportion was observed by the omission of any features likely to stand out unduly, or to burden the design with unnecessary successiveness, or the concentration of ornament at any one point.

In setting out the work a board is required that will take at least half the full size drawing, or it may be done on rough packing paper with chalk. If the latter is used the hot iron when placed near, or on, it is likely to scorch the paper, so

the top bar. The two were fitted together and screwed up with flat headed countersunk screws well driven in as at A, Fig. 2.

The Grille itself it will be noticed consists principally of two main scrolls. These with minor offset scrolls and the sway and ribbons constitute the whole. The two large scrolls were made from $\frac{3}{4}$ in. by $\frac{3}{8}$ in. flat iron and secured top and bottom to the frame and also where they meet together at the top, by flat headed countersunk screws run into drilled and tapped holes. They were formed of two pieces of iron each.



AN ORNAMENTAL GRILE OF WROUGHT IRON IN A LONDON MANSION

which were two narrower openings that were also to be blocked up with equally ornamental grilles to match. They filled a rectangular opening square at the top, not arched like the one shown in the photographic view.

Being purely ornamental in its function it was permissible to make the lurette grille as light and graceful as possible, although, at the sametime, it was desired to keep it from having any appearance of fliminess. Cost was not so great a consideration as the provision of something that would look well and not was tawdry and over elaborated, so it would be quite out of place.

In regard to the construction it will be observed that apart from the leaf work the design is quite simple, and as the work was of such a light,

use an old door or other suitable board and ordinary chalk.

It will be noticed that the whole of the scroll work is enclosed in a frame, the shape of the arch to which it fitted closely. This frame was made of 1 inch by $\frac{1}{2}$ inch flat iron, the top arch-shaped piece being made from one bar, cut for the bend and the straight bottom piece being cut from another. After the former had been bent to shape it was filed clean at the ends and a rabbeted joint filed in to a depth of $\frac{1}{4}$ inch to take the bottom bar, which it must be noted was cut off with an allowance of $\frac{1}{4}$ inch at each end to make the joint. Two $\frac{3}{16}$ inch holes were drilled and tapped into the ends of the bottom straight piece and the same into the flat side of the ends of

The first—a short piece commences with the same horn, pediment—like scroll and continues to the first leaf B which covers the point where the larger scrolls were welded on. The small scrolls branching off from the inside of these at the top were separate and simply screwed on under the leaves which were also screwed on.

The other principal scrolls began with the segmental piece in the lower centre, and down to the second husk were made of $\frac{3}{4}$ in. by $\frac{3}{8}$ inch. From the husk C $\frac{1}{2}$ inch round iron is used. It is welded to the flat scroll at a point covered by the husk C. The $\frac{1}{2}$ in. round iron continued to the husk D. Here the end was flattened, the continuing scroll $\frac{1}{2}$ in. by $\frac{3}{8}$ in. issuing there-



from being welded on. This flat scroll was continued on under the leaf so as to be screwed to the outer frame and also to the inner scroll where the leaf touches.

Where the round scroll crosses the other a groove is filed in it $\frac{3}{16}$ in. deep and wide enough to take the $\frac{3}{8}$ in. thickness of the other scroll. It is secured then by a $\frac{1}{8}$ in. drilled and tapped hole through which a screwed wire is run and the hole having been slightly countersunk on the round iron, the wire is cut off and

hollowed in the bumping up to receive it, and a screw through the bottom of one of them kept it in place.

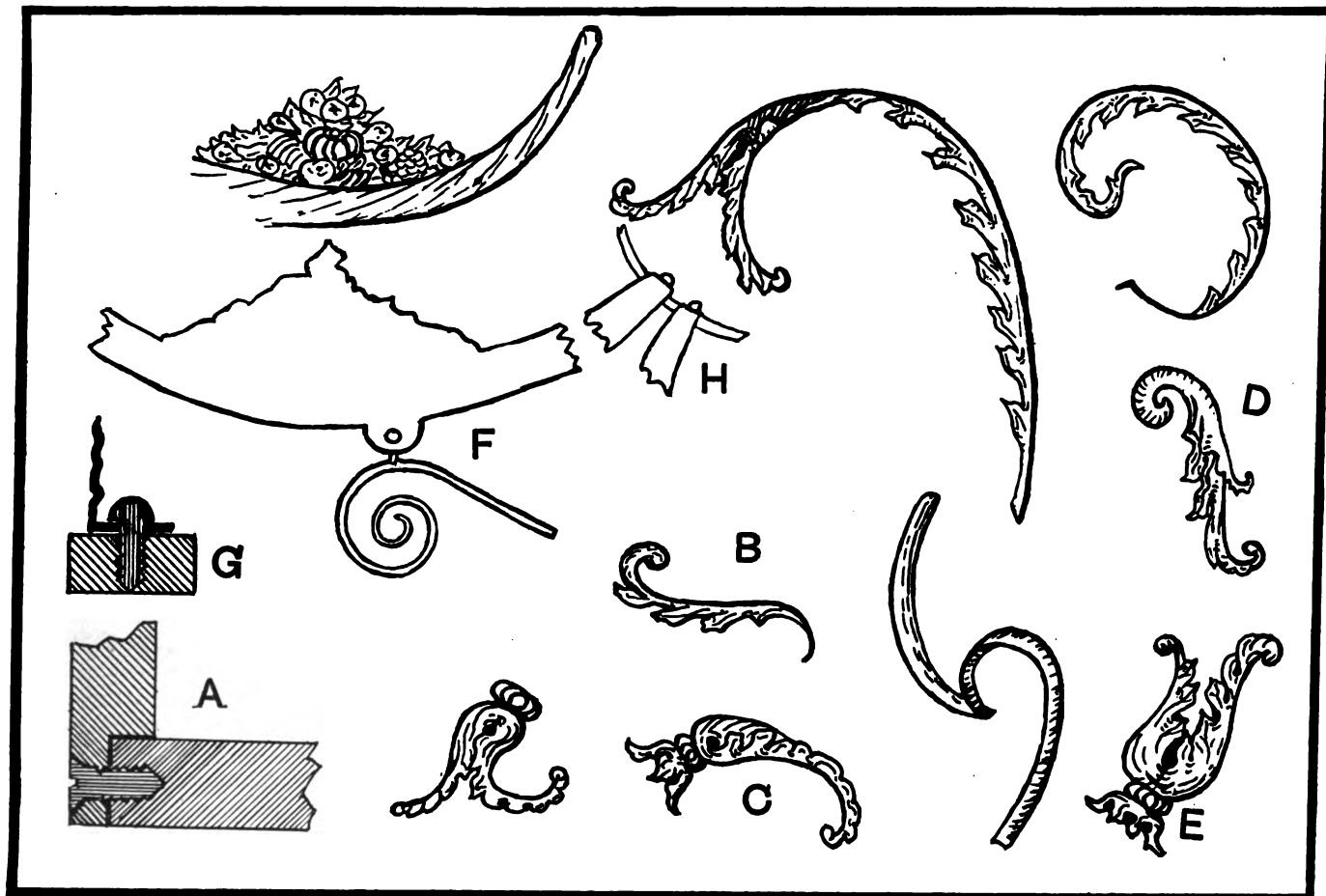
The swag was made from sheet metal, both sides being alike, as the grille is seen from each side below. In cutting out, a half circular lug piece was cut on the bottom of each, $\frac{1}{2}$ in. across as at F. These were bent at right angles and being drilled through, allowed a ball head screw to secure the swags at the bottom, but were themselves together with the ball head screws quite out

work which is not likely to receive rough usage. Besides there is nothing projecting like the ball head to interfere with the design.

A Toast to the Horse

We don't know who wrote this toast to the horse, but it a good one and worthy of being placed beside Senator Vest's famous eulogy on the dog:

"Here's to that bundle of sentient nerves, with the heart of a woman, the eye of a gazelle, the courage of



DETAILS OF THE ORNAMENTAL GRILLE SHOWING BOTH CONSTRUCTION AND ORNAMENTATION

rivettted neatly over, then finished off by a smooth file and emery cloth.

The husks shown at E were formed of leaves beaten up in thin sheet iron. They were secured to the round iron by the collar piece in the centre of each. The round iron was heated and fagged with a punch, the collar was made red hot, the narrow slip left on the leaves at this part were inserted with the round iron between them and the whole welded together by means of a punch and a die, the fluted pattern being formed at this time by the same tools.

The little ring in the centre was of the same size round iron and was held in by the husks which were

of sight when the swags were bent into place as at G, and secured at the tops. Here the swags were secured by ball head screws from the inside of the scrolls H the ends having been made to overlap the scrolls to that extent. The ribbons at the sides were only single, however, and both they and the swags were of thin sheet metal of a good brand to stand hammering up.

The leaves shown on the scrolls generally were simply fixed on with screwed wire which was cut off and neatly rivettted over the leaves and finished off. This method is neater than using the common ball headed screw and quite as safe for light

a gladiator, the docility of a slave, the proud carriage of a king and the blind obedience of a soldier; the companion of the desert plain, that turns the moist furrows in the spring in order that all the world may have abundant harvest; that furnishes the sport of kings, that with blazing eye and distended nostril fearlessly leads our greatest generals through carnage and renown, whose blood forms one of the ingredients that go to make the ink in which all history is written, and who finally, in black trappings, pulls the proudest and the humblest of us to the newly sodded threshold of eternity."



The World's Record in Horseshoe Making Broken

Mr. George Timlin of Philadelphia has, according to the "Public Ledger" of that city, recently broken the world's record for making horseshoes. Mr. Timlin turned out twelve dozen shoes in three hours, fourteen minutes, 50 seconds. This is considerably better than the previous record of twelve dozen shoes in four hours, forty-nine minutes, made by Mr. Joseph L. At. Wonder how long the record of Mr. Timlin will stand before a new "speed artist" breaks into public view! One hundred and forty-four shoes in less than one hundred and ninety-five minutes is "going some," but cannot some one turn out a gross of shoes at the rate of one a minute! It is rumored that a certain make of automobile will soon be produced at this rate.



The Machine and Tool Smith

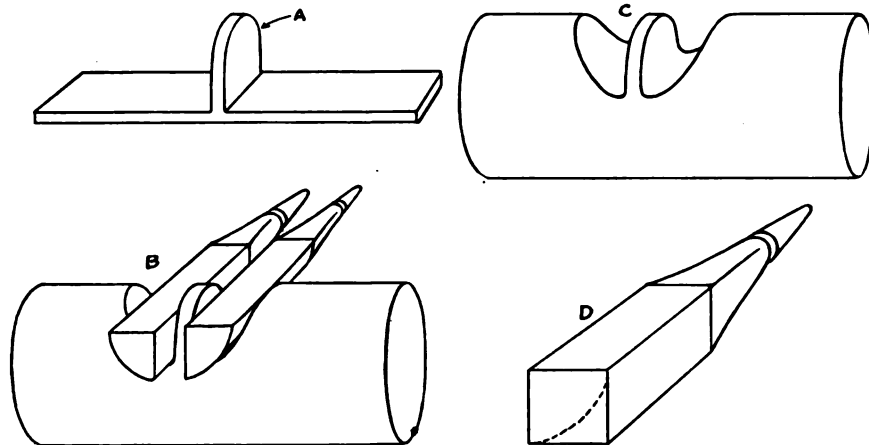
When Round Stock is an Advantage

BERT HILLIER.

A very common forging is one as shown at A in the engraving. It is not so much the writer's intentions to show one of the different ways to make them under a steam hammer as it is to show the shape of the stock it can be made from to the best advantage. Most smiths, in making this piece, take a piece of square, soft steel and with the same tools and in the same manner forge it as shown in the sketch except their lug will be straight across the top. Then to make the end round they have to cut off the corners and use a swedge to shape it up. Needless to say this consumes time. A glance at the engraving shows that when made of round stock the blocking out and rounding up is done in the one operation.

It must be remembered that the round stock must be of larger diameter than if made from the square, or the same number of cubic inches in each across the stock will

would appear desirable that where there is not sufficient material, or where the total work of annealing to be done at any particular works does not warrant the expense of erecting



WHEN IT IS AN ADVANTAGE TO USE ROUND STOCK

make it. The best way to make the side tools shown at D is to take a piece of square tool steel and after drawing down the handle, take a chisel and pare off one corner at dotted lines as shown. This makes one of the handiest tools to be found in the smith shop.

Annealing Chains and Hooks

WALTER J. MAY.
(English Mechanic.)

When subjected to stress, all wrought-iron gradually alters from a fibrous to a more or less granular structure, and in regard to this temperature has some influence. In some cases this structural alteration of the metal does not involve chance of danger, while in others risk of damage and personal injury assumes a serious aspect, and for this reason remedial treatment must be adopted. Chains and hooks used for lifting purposes particularly become dangerous when the metal gets "tired," while other things made of wrought-iron need attention from time to time. As a general thing, the quality of the iron used only renders the question of treatment depend on time, as ultimately all grades of iron fail for the same reason, it being only a question of a longer or shorter period when the work done is the same.

Usually re-annealing and testing at frequent intervals forms the only safe procedure, and to ensure that this is done it often happens that the duplication of chains and the like should take place, while it also

a proper close-annealing oven, the articles should be periodically sent to some place where the work can be efficiently done. In fact, in the writer's opinion, annealing and testing of chains periodically should be compulsory, and to carry this out special works should be devoted to this class of work in convenient centres, only places having proper facilities for doing the work being allowed to do it on the spot.

Open annealing is not generally desirable, while making chains and the like red-hot in an ordinary fire is most undesirable, as not only is the heating irregular, but the metal can be very much damaged in the process where extreme care is not used. It being necessary that the chains, etc., be properly heated, it is also desirable that they do not touch the walls of the oven or furnace, and generally it is desirable to have low trucks having open bar frames and floors on which the articles would rest during annealing. This, of course, necessitates a well-built oven where it is used frequently, and as the heat used in annealing would be sufficient to make cast-iron very tender and weak, only wrought-iron could be safely used for work in the construction of the oven, but, of course, for firebars and other furnace fittings cast-iron would be used, as is generally the case. The furnace erection would have to be held together by bands or plates of wrought-iron with good tie-bolts, and the general idea of the construction of a permanent oven is shown in Figs. 1 and 2, some alterations of detail being necessary to fit each place



of erection. The floor of the annealing chamber should be level with that of the workshop for the greater convenience in running in the truck, and generally this is not a disadvantage unless there is much water in the soil and drainage is very difficult to arrange.

Furnaces and ovens would, of course, be of firebrick, and would necessarily have to be well put together, men used to fire-work being engaged to do the building, as this kind of work is usually beyond the experience of the ordinary brick-

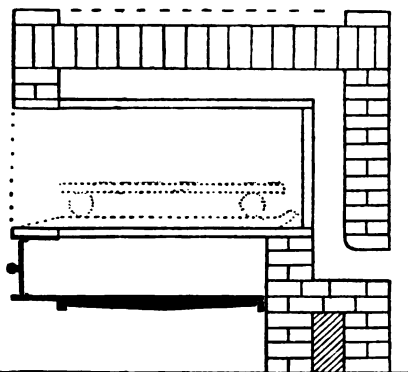


FIG. 1.—SIDE VIEW OF A PERMANENT ANNEALING OVEN

layer. Experience is necessary to get the best results, as there are a good many little wrinkles picked up in working which do not become general knowledge in any purely practical trade, and usually it is this kind of thing that counts. The greatest trouble will arise in putting the oven together, as the heat has to pass through its walls, and as the annealing temperature required is about 1,350°F. inside the oven, usually the walls would have to be much hotter, owing to the difficulty of heating a large body of air or gases, and probably for at least a part of the annealing period the walls would have to be at a temperature of at least 1,500°F., which is rather a brilliant red heat. Naturally, the thinnest practicable walls will be used, and fireclay tiles of a really good quality will necessarily be selected. A sufficient allowance for expansion and contraction must be made, and as the process of annealing consists of raising the metal from a cold state until the required temperature is secured, holding it there for some hours, and then cooling down again, the duty imposed on the oven walls is a pretty severe one.

The annealing is done by loading the chains or other things on the

truck, placing this in the oven, and after closing and sealing this, gradually heating to the annealing temperature and then holding this heat from four to twelve hours, according to the size of the articles, after which the oven is allowed to cool off. After being removed from the ovens, the chains, etc., should be well brushed with wire brushes until clean, and examined in all parts after which testing should be done and a further examination made. Any defective links in chains will be cut out and replaced as a matter of course, and other articles which are faulty will be suitably dealt with, in some cases entire replacements being made.

For occasional work it is possible to make up a temporary oven from a metal pipe of suitable size, as roughly shown in Figs. 3 and 4, the thing being used possibly two or three times before it fails. In such cases the articles to be annealed would be placed on a rough grating in the pipe, as indicated. In putting up such a temporary oven it is generally sufficient to use ordinary soft bricks, and usually "grizzles" or "place" bricks will stand the fire better than "stocks," but, of course, they crumble away when the erection is pulled down. The arrangement of the flues and furnace is very much the same in all cases—a long-flame coal being usually selected for fuel.

Properly done, close annealing does not appreciably oxidize the surface of the metal in the same way that open annealing does, and, while producing better effects, it should remove all rust and dirt from the surface without ill effect to the metal treated. For some purposes, the open annealing furnace possesses advantages, say, for tube drawing as an instance, as the oxide is pickled off and the tubes oiled between each visit to the drawbenches; but this would not apply to the annealing of chains and other haulage appliances.

It often happens that welds prove defective where iron appliances are liable to get wet and rusty, although they have passed heavy tests when new, this being caused by the rust working into and expanding small cracks where the metal has not been thoroughly united. After annealing and cleaning, these should be especially looked for, and particular attention should also be paid to hooks and rings, as both of these develop faults which can only be readily de-

tected after annealing.

As to the frequency of annealing necessary for general safety, it may be taken that in constant use, with full but safe loads, light chains and hooks require attention every three or four months, medium chains every four to six months, and heavy chains anywhere between six and twelve months, according to work done. In addition, regular periodical examinations should be made at periods varying from a week to a month, according to the conditions of working, but no longer time than a month should elapse between examinations. Of course, no risks should be taken, and where faults appear they should be at once remedied. In addition to the chains and hooks themselves, the attachments to the winding drums should also be closely examined at the same time, because a few fathoms of only half-inch chain coming down from a hoist can do a lot of damage, as the writer once saw, two men and a pair of horses being killed and a van wrecked where a 10-cwt. load was being lifted into a warehouse, the coupling on the windlass drum parting and the whole lot—load, chain, and loose gear—coming down on the van. Everything was sound but the coupling, which had a fracture like broken loaf sugar, and probably was not much stronger.

The accompanying engraving shows a music stand that I made. I have seen some fine examples of ornamental iron work in the pages of "Our Journal" and thought I would try my hand at making a music table or stand, as I am a musician as well as a blacksmith.

I made the table entirely by hand. No machine was used and even the holes for rivets and bolts were drilled by hand. The letters of the name

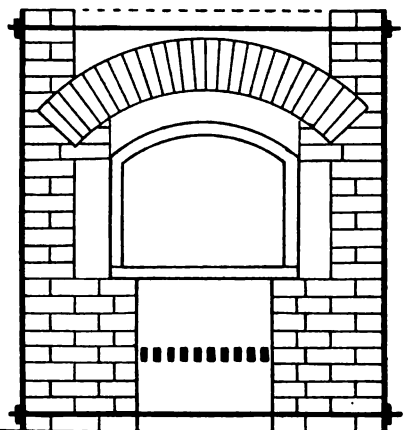


FIG. 2.—SHOWING FRONT ELEVATION OF THE OVEN STRUCTURE



are welded except the S, which is bent to shape. There are two places, as may be seen, to hold sheet music and books.

Editor's Note:—We want to compliment Mr. Edwards upon his work. The scrolls are neatly turned and altogether he has produced a really artistic and neat piece of ornamental work.

All About Rust

J. F. SPRINGER.

Rust is a chemical combination of the metal iron and the gas oxygen. Now there is plenty of oxygen in the atmosphere, so that a piece of iron or steel has ordinarily an abundance of oxygen in its neighborhood. However, the iron and the oxygen will usually not unite to form rust, unless moisture in some form is present. Unfortunately—that is, unfortunately from the point of view of preventing rust—the air has moisture in it pretty much all the time. If the air could be kept perfectly dry, an iron or a steel article would probably either rust very slowly or not at all.

Water contains ordinarily more or less air in the form of minute bubbles. This air is what the fish

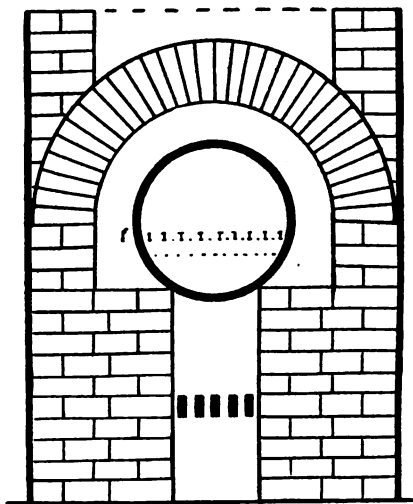


FIG. 3.—FOR OCCASIONAL USE A TEMPORARY OVEN CAN BE ARRANGED

breathe. If a piece of iron or steel could be kept completely covered in water that was entirely free from air, it would probably not rust at all or only at an extremely slow rate.

Now we can not ordinarily keep our iron and steel articles in a perfectly dry atmosphere or submerged in water containing no air bubbles. Consequently, we have plenty of rust. Still, we may prevent rust, if we can take the hint from the dry air and the air-free water. We can

prevent rust if we can exclude from the metal all contact with air and water. This is the reason that we can prevent drills, chisels and other tools from rusting by keeping them coated with *vaseline* or some kind of oil. This is the reason that *paint* protects against rust. This is the reason why a coating of nickel or zinc safeguards the iron or steel. There are numerous other methods, more or less successful; but there are but few of these others which can be readily practiced in a blacksmith shop. Thus, if the metal be made to form on its surface a dark coating known as the black oxide of iron, it will have a fair protection against rust. But the smith is hardly in a position to apply the process.

A zinc coating is not everywhere impossible. It may be applied by a hot or a cold procedure. In the hot process, the article is first thoroughly cleaned. It is then coated by dipping it into molten zinc. The cleansing process should be carried out very completely and may very well include pickling in an acid solution. The cold process requires special apparatus. The zinc coating is given by an action similar to that used in nickel plating. The hot process is the thing to use in a shop, as it is a simple method. Neither the hot nor the cold process is to be regarded as giving perfect results. How perfect may be judged by noting galvanized objects all around one. Hot galvanizing may, however, be depended upon to give good ordinary results.

A good deal of rusting can be prevented by avoiding putting iron or steel in contact with other metals, especially in situations where there will be exposure to the weather. A good example illustrative of this principle is the case where wrought iron stay bolts were employed in a steel vessel. Here the one metal was wrought iron, which has been thought to be so excellent a resister of rust. In this instance, however, the combination with steel operated to rust the wrought iron.

Let us go back now to *paint*. This is perhaps the thing most used to protect iron and steel against rust. It seems to be about the only practical thing to use in many cases. But there are paints and paints. Linseed oil is recommended as the best oil for an oil paint. It may be the boiled or raw variety. It is said that the boiled oil will give somewhat the better results, but that the boiling

should hardly be done by people not experienced at the job. It is important that the quality be right—"A good 'linseed oil is of a pale, yellow color, brilliant, limpid, drying well with a rich luster, and having a pleasant nutty taste.'" When it is desired to paint a surface of iron or steel, it will be well to heat the surface, if possible, for the purpose of promoting the drying process. When

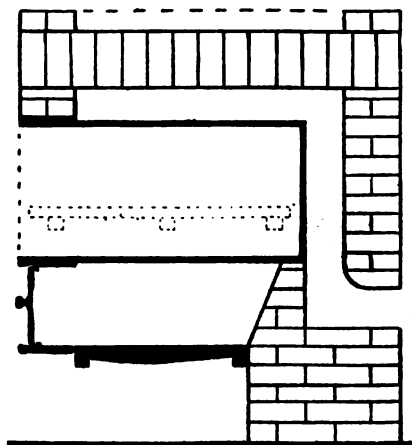


FIG. 4.—SIDE VIEW OF THE TEMPORARY OVEN

this is out of the question, it is recommended to heat the paint itself, say, to 150 degrees, Fahrenheit. A naval writer, quoting an authority says: "It may be laid down as a normal standard, that presupposing the use of good paint, one bottoming coat and three subsequent coatings, laid on at suitable intervals, will be required to produce a layer of sufficient thickness on iron to keep moisture away from the metal and to protect the latter from rust for a certain time." The metal surface may advantageously be sponged off with gasoline, if the metal has never yet been painted. This has not only a cleansing effect but tends to assist clearing the surface of moisture. The sponging off will remove any fine pieces of rust that may be clinging to the surface. Their removal is regarded as most important. "Painting over fine particles of rust saturated with water is one of the chief causes of the poor results" often obtained in painting steel. Where one coat of paint is to follow another, it is advisable to sponge off the painted surface with water in which brown soap has been dissolved.

Wherever a metal surface is to be painted, that surface should be made as clean as possible. In the foregoing, some remarks have been made along this line. There are cases



where a good deal of trouble will be necessary before a proper surface is presented. If there is already a coat of rust, it must be gotten off. A wire brush may be useful here, a file, a scraper, etc. Whatever is used, whether with tools alone or with tools and chemicals, let there be no nonsense permitted. Get everything that isn't part of the metal off of it.

In applying paints, let it be well remembered that the various coats should be worked into all crevices and nooks and crannies. Otherwise, a trouble spot may be provided. Be sure that the moisture and oxygen in the air will search everywhere and will succeed in starting the rusting process if any opportunity is afforded.

It may be added at this point that absolutely pure iron would probably not be subject to rusting. There is some pretty good evidence for this statement. At Delhi, in India, is a column of iron about 60 feet high. Its weight is somewhere in the neighborhood of 19 tons. It stands exposed to the weather and has in fact been standing thus for nearly 3,000 years, so it is thought. But it is not a mass of rust. According to our usual experience with iron, this pillar should ages ago have crumbled to pieces under the effects of oxygen and moisture. Again a year or so ago, Sir Robert Hadfield, a distinguished British authority on steel, made report upon a nail, a chisel and a bill hook which are said to have been exposed for 500 years. These specimens consist of iron containing practically no carbon at all and practically no manganese. At Newburyport, Mass., there was erected in 1809 a suspension bridge in which iron chains were employed. This bridge was in service 100 years, the last 70 of which saw no painting done. The iron was very pure, to judge by analyses of three of the links. There was present a very small amount of carbon and practically no manganese. The material was, in fact, a good pure wrought iron. There has been an effort in recent years to produce a pure iron in order to get the good results of the oldtime wrought iron. There is one, perhaps more, such special irons on the market today. They base their claim to rust-resisting upon their purity. The ordinary wrought iron that is bought and sold is but little different from a very low-carbon steel. One of special brands of pure iron is furnished under a

guarantee to contain less than a total of 0.16 per cent. of impurity. As impurities are reckoned carbon, manganese, sulphur, phosphorus, silicon, etc. It is not claimed that even this pure iron will never, never rust. But it will rust very slowly. It seems too bad that we can not commercially reproduce the ancient iron of the kind seen in the Delhi column or

ordinary methods are objectionable from some point of view or are more or less expensive.

Sodium citrate has had considerable reputation as a suitable chemical to use in removing rust. And it is, no doubt, a successful one. Thus, Messrs. J. N. Friend and C. W. Marshall report that a certain strong solution of this chemical effected the



A FIFTEEN CENTURY GRILLE IN THE CATHEDRAL OF DIJON, FRANCE. IT SHOWS THE INEVITABLE PITTINGS OF AGE

that in the Newburyport links. It does not seem to be altogether clear that even the old iron makers always got the rust-resisting results. That is to say, the column and links may perhaps be disclosers of results unexpected by the makers.

Of course, it is much better to prevent rust than to remove it after it has once manifested itself. Unfortunately, however, we have to deal with things as they are and not as we would wish them to be. The removal of rust is, accordingly, a very real practical question. It is a very live question—largely because the

entire removal of rust from a test plate of steel in the course of 4 days. The strength of the solution was considerable, the sodium citrate constituting 20 per cent. of the whole. This procedure is applicable where cost is no bar. Sodium citrate, according to these investigators, removes not only the rust but an appreciable amount of iron as well. This may or may not be important. In ordinary circumstances, the loss of iron is too inconsiderable to constitute an objection. Expense, then, is the principal matter to consider. As the chemical is about as expen-



sive as camphor, a 20-per cent. solution will not be a cheap article for the quantities necessary for the immersion of ordinary articles of iron and steel. A weaker solution (10 per cent.) proved effective, but the time was about double.

Boric acid (boracic acid) is another suitable chemical. It is not exactly cheap when we think of actual weights; but as a saturated solution requires only about 3½ per cent. of the substance, the various solutions are not so expensive as to be prohibitive for multitudes of uses.

Various strengths of solution have been tried from 0.5 per cent. up to 3.5 per cent. All solutions seem to effect a degree of cleansing from rust. In fact, the weakest of all had accomplished a complete cleaning of a rusty piece of sheet steel in 11 days. There is some reason to think that this result was exceptional. The really successful solutions were the 2 per cent. and the 3½ per cent. The weaker cleaned its rusty plate in 11 days; the stronger, in 2 days. In all cases, more or less iron was lost besides rust.

The foregoing results refer to small squares of sheet steel that had been purposely rusted by soaking in water and then exposing to the air for one month. The length of time required for the complete removal of rust in these cases can not be taken as the time necessary for other and different cases. No doubt, rust clings to one piece of iron or steel more persistently than to another. The chemical differences in various samples of these metals may be responsible. The important thing to learn is that a reasonably strong solution of boric acid is effective. What time will be required can hardly be

determined in advance. In fact, if the article to be cleaned is more or less irregular in form or the rust is thicker in one spot than in another, it is to be expected that one part will be clean before another. The thing to do is, ordinarily, to leave the article in the cleansing bath until the most obstinate places lose their rust.

In this connection, it will sometimes be important to know what is going to happen to those parts already free from rust, when immersion is continued for the purpose of clearing the remainder. Here is where the solutions of boric acid appear advantageously. The clean metal suffers some, whether sodium citrate or boric acid is used, but with the boric acid the effect on the metal is slow and inconsiderable. With sodium citrate, on the other hand, the clean metal seems to be eaten away with some rapidity, comparatively speaking.

Other chemicals were experimented with by Friend and Marshall; but no results equal to those with boric acid appear to have been obtained. A 10 per cent. solution of aluminum sulphate was very effective, cleaning the iron of rust in one day and giving a good metallic surface. It is not clear just why this chemical was not favored by them. Perhaps it ate away the metal itself too rapidly. Solutions of other substances tried were those of chromic acid (1 per cent.), zinc sulphate (saturated), magnesium chloride (saturated) and ferrous sulphate (10 per cent.). These either operated too slowly or there was some other objection. They give the palm to boric acid.

The same persons have conducted experiments to determine whether

cast iron or steel is more susceptible to rust. The results of their investigation do not favor either to the exclusion of the other. Cast iron resists better under one set of circumstances; steel, under another set.

A typical gray cast iron and a mild open-hearth steel were metals tested. Exposures were made in



PRESIDENT GRANT'S PERSONAL CARRIAGE, BUILT TO HIS ORDER

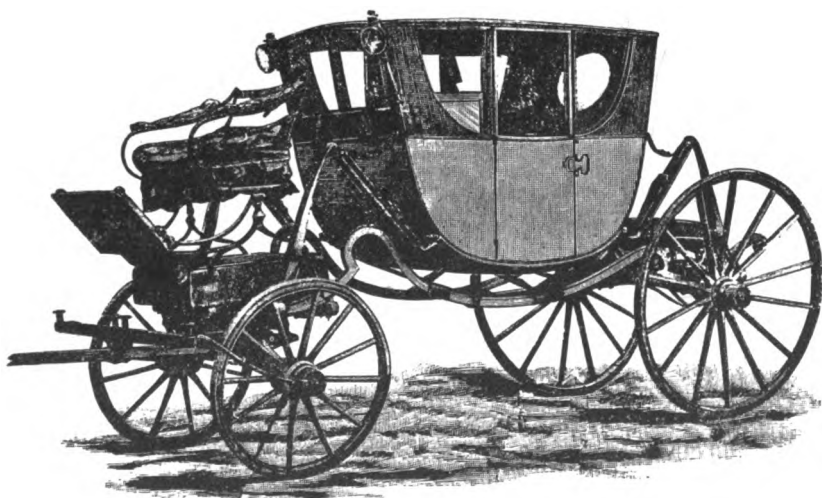
connection with ordinary water and with salt water. Tests were made in which the metals were alternately wetted and dried. Then the actual conditions of the weather were imitated by wetting and drying, heating and cooling. Further, simple alterations of heat and cold were also tried. Finally, various strengths of dilute sulphuric acid were used to corrode the test pieces of the two metals.

In the tests where the metals were now wet and now dry, whether the temperature remained constant or was alternately warm and cool, the cast iron proved decidedly the better of the two as a resister of rusting. That is to say, if cast iron and steel are exposed to the changes which usually occur in the atmosphere from day to day and hour to hour, cast iron resists rust better than steel.

Where the metals were entirely submerged, whether in fresh or salt water there was little to choose between them. The one metal is about as good as the other.

But the dilute sulphuric acid tests showed that steel was a better resister of rust. There is, however, little or no practical value to this result, as we use neither cast iron nor steel to any extent where there is exposure to acid solutions.

Other things being equal, a cast iron article is better fitted to endure the vicissitudes of the changes of the weather than a steel article. Where the articles are to be completely un-



GENERAL WASHINGTON'S PRIVATE COACH PICTURED HERE IS NOT MUCH LIKE THE MODERN PRESIDENT'S LIMOUSINE



der water all the time, one material is about as good as the other, whether the water is sea water or fresh water.



Benton's Recipe Book

To waterproof tool bags or cases made of duck or other cloth, either of the following formulas may be used:

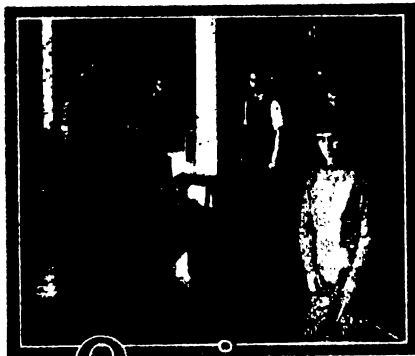
Use $\frac{1}{2}$ pound of alum and 2 ounces of saltpetre dissolved in 1 quart of water. Immerse the article to be waterproofed in this mixture for 40 minutes, and boil hard; then rinse in cold hard water, hang up and let dry thoroughly before using.

Melt $\frac{1}{2}$ pound of paraffine wax and mix in 1 quart of gasoline. Immerse the article in this and wring out and spread out to dry. In a short time it is ready to use.

Yes, system is what we mean, not red-tape, when we speak of business and accounting methods. When system becomes red tape, then it's time to quit and start anew.

A good temporary repair of a gasoline leak may be made by covering the opening with a wad of soap and then wrapping with tire tape.

Anti-skid chains should be applied so the hooks are turned away from the tire so as not to chafe or cut the tire casing.



Queries— Answers— Notes

Scrap Leather to Sell—Kindly inform me through "Our Valuable Paper" if you know of any manufactory that buys scrap harness leather. The leather is new and in size runs from 2 inches square to 8 inches wide, and 12 inches long. I have about 100 pounds. There are manufacturers who buy that kind of leather and I would like to get their address.

FAITHFUL READER, Pennsylvania.

On Plow Tempering—Will some one

please let me know how to temper the lay of an engine gang plow (cast or crucible steel lays) that have to be used in hard sand, mixed prairie. Also what to use and how to temper soft center steel for use in the same soil, so the lays will stand to plow at least a half-day and so they will not bend or show much wear and will not look like a saw. I intend to start up a repair and blacksmith shop in western Nebraska in the spring, but the plow men there were telling me that they had so much trouble with the lays. Which are the best to use, a trip hammer or will the Justrite blade and disc sharpener beat them all? HENRY GREENE, Nebraska.

A Family of Seven Smiths—In the October number of "Our Journal" was an account of a family of blacksmiths. I want to submit the following information concerning the family of John E. Flammer of Springdale, who recently died at the age of 63. This man was a blacksmith and he had six sons, all grown up and following the craft of their father. Mr. Flammer, the father, conducted a smith shop for 42 years, was a clerk of the Board of Education, vice-president of the Home-School Association and devoted most of his spare time to the advancement of education. I. J. S., New Jersey.

Welding High Speed to Soft Steel—I would like to get, through the columns of "Our Journal" a recipe for welding high speed steel to soft steel. J. W. H., Ohio.

In Reply—This operation—welding high speed steel to soft steel is said to be impossible of accomplishment by many smiths. At best, it is well known that the stunt is a hard one and several compounds are suggested that will accomplish the work. Here is one that is suggested for trial: Finely pulverized borax, 12 ounces; carbonate or iron, one ounce and dry Venetian red, three ounces. Mix all thoroughly and use in the regular way. If the soft steel persists in slipping, try adding some clean, sharp iron drill chips to the above, heat both steels very carefully and experience may enable you to secure a good weld. L. F. S., Pennsylvania.

Handling the Cramping Horse—Your correspondent, S. S. Yager, Indiana, asks for information regarding the shoeing of horses that "cramp" in their legs while you are shoeing them. It occurs to me that his trouble is what we call "shiverers" in this country. The symptoms are; when you attempt to pick their feet up, they spread their four feet out and commence to shiver all over and for the moment it is almost impossible to lift their feet. I have had some little experience with such horses and in each case they were big, powerful animals, but with no vice whatever. The best course to follow in such cases is to adopt quick and quiet methods. Never shout or knock them about. After the few moments, the attack of shivering will pass off. Always wait for this, then the foot will come up quite easily and make the best use of your few moments till the attack comes on again. Don't maul the leg about, but let it lie comfortably on the hip. By following these methods the job can generally be got through without much trouble. If in Mr. Yager's case, the horse pulls him into the planking he must keep out of it, by handling the leg as near the foot as possible

and by so doing, compel the horse to bear his own weight. Trusting this may be of some use to him and other readers.

THOS. NORTHWOOD, England.

Several Questions on Band Saws—Could some one give me some information regarding band saws as follows: What width saw is best suited for wagon shop work? What speed should a 20-inch band saw run? Would rubber belt be all right to face band saw with? Could you give me information as to what kind of glue I would need to fasten rubber belt to iron surface of wheels? Also I would like to know the best way to solder a band saw. L. S., Illinois.

John Barleycorn and business—I have come to the conclusions that the fellows who are making a big noise about prices are not using what money they do make in the right place. Too much is spent in liquid "stock." Don't care who it is or how much he weighs, John Barleycorn is not a customer that any business concern is looking for.

Now, this is not going to taste good to some, but it is a fact: 99% of smiths have brains for smithing, nine per cent. of smiths have brains for business.

B. J. STORRY, Michigan.

A Blacksmith Family of Ten—In looking over "Our Journal," I see another blacksmith family. How is this for still another one?

Great-grandfather—Whitney.

Grandfather—Whitney, Francis.

Father—Whitney, N. T.

Three Uncles—Whitney, Ira, Eli and Job.

Two Cousins—Whitneys, Frank and Blanchard.

Brother—Whitney, S. J.

Myself—Whitney, Wm. F.

There are five of us still in the blacksmith business. My father has taken "Our Journal" for years, and since I have been in business myself, I have never been without it. I enjoy "Our Journal" very much and I find articles that are worth a great deal to me. My aim is to do good work at reasonable prices and treat every one right.

WILLIAM F. WHITNEY, Utah.

Aluminum Bronze—Please inform me through your information bureau how to mix aluminum finish that is used to put on nad finish horse shoes. What kind of aluminum bronze—what kind of oils to mix with it and in what proportions mixed, and how to apply it. Give directions how to use.

JOHN BRAMLAGE, Kansas.

In Reply—The bronze powders are usually mixed with an oil commonly known as "banana oil." This can be procured at practically any drug store or paint supply house and it is usually supplied with the powder that is to be applied. In mixing this oil with the powder, use enough oil to make a mixture of easily workable consistency and so that the powder can be applied evenly and yet sufficiently thick to cover the material to be painted. A little experiment along this line will enable you to soon mix the bronze to the proper consistency.

SERVICE BUREAU.

Heating a Smithshop—Will you please tell me the best way to heat my new blacksmith shop? I am going to build one 60 by 70 feet. This is a pretty cold



climate and we need heat in the winter, so would like to know the best way.

E. H. ARHEBTON, Idaho.

In Reply:—In order to arrive at the best means for heating your new shop, it would be necessary to take into consideration the cost of the fuels which are available, the distance which any heating apparatus would need to be shipped, and also the means which you have of generating power for your shop.

For example, consider the cost of coal, coke and wood as heat generators then consider in connection with this, the length of time it would be necessary for you to operate a heating plant or the length of time during which you require heat in your shop. Then consider, that while you are now perhaps employing a gas engine for generating your power, it may be possible for you to install a small boiler and steam engine for power purposes, especially as you would then be able to generate enough steam to heat your shop—steam heat perhaps being best suited for the extreme cold which you experience in your locality. If you are doing any wood-work, particularly if you are doing a considerable amount of it, the steam boiler would perhaps be fired at least in part, with the shavings and short ends from the wood shop. If you are not doing any wood-work at all, this fact, taken into consideration with the possibilities of adding a wood-working department, would also need to be considered.

SERVICE BUREAU.



The Automobile Repairman

A Bar to Bore Cylinders—Please advise a way of making a boring bar for reboring gas engine cylinders, both upright and horizontal, from 7½ inch size and under.

R. E. SCHOONOVER, Wisconsin.

In Reply:—A boring bar for reboring gas engine cylinders consists of simply a straight bar of proper size to insure rigidity, with a slot for holding the cutter bar. A practical arrangement of this kind is shown in the engraving. A represents the face plate of the lathe, B the clog, C the boring bar, D the key holding the cutter in the slot of the boring bar. The boring bar it will be seen extends through the cylinder F to the tail studs G. In the end view Fig. 2 the operation of the cutter is shown; F representing the end of the cylinder, E the cutter and C the boring bar. It is, of course, of the greatest importance that the boring bar be sufficiently heavy for the work and that

the cylinder be fastened rigidly to the saddle of the lathe.

L. H. J., New York.

An Air Compressor for Forges and Autos—We are considering the installation of an air compressor and storage tank for automobile service and want the outfit of sufficient size to run two fires for general work. We have no data at hand and thought possibly you could give us the desired information.

What size compressor and what capacity of tank would be required to operate two fires for the average run of work, so that pumping air twice a day would be sufficient. Of course, the quantity used would vary considerably, but the idea is to have ample capacity with plenty reserve.

In plow-time the engine is always running and pumping up would be very easy—but in shoeing time the power is seldom on.

Any information you can give us will certainly be appreciated.

T. E. WILSON, Missouri.

In Reply:—It is evidently your intention to operate your compressor with a gas engine. We believe, however, that you will find this means of operation considerable bother, trouble and annoyance and would suggest electric motor operation for the compressor. In this case, the plant can be operated entirely automatically, the motor being switched into or out of operation whenever the air pressure is raised or lowered to a certain point, as the case may be.

You are now probably using a pressure somewhere between 1½ and 3 inches at each of your fires, though, it will, of course, be necessary with your storage tank to have an air pressure considerably higher as a great deal of pressure is lost due to friction in passing through the blast pipes; for example, it is generally figured that every elbow in the blast piping adds as much friction as 10 diameters of pipe. It is therefore easily seen that a great deal of pressure is lost in friction in the piping and it is also important that the line from the storage tank to the forges be just as straight and free from elbows as possible.

Another point to bear in mind in this connection is to get the blast pipes of proper diameter. Pipes that are too small produce undue friction. You will probably find that the main blast pipe of 4 or 4½ inches in diameter will be necessary in your installation with branch pipes of 3 inches to each forge.

SERVICE BUREAU.

Tempering Auto Springs—I repair automobile springs and also make new ones, but do not temper them. I want to know how to temper an auto spring so as to make it very flexible.

H. S. S., Pennsylvania.

In Reply:—There seems to be quite a little controversy on this subject. Even the men who are supposed to know all about it disagree on the point of whether or not the temper should be drawn on springs on this kind. Some of these men are very emphatic in their claim that the spring is not properly made unless the temper is very carefully drawn in oil while others are just as emphatic in their claims that no temper need be taken.

In conversation with a western smith just a few days ago in which this subject was mentioned this man stated quite for-

cibly that the springs which left his shop were generally satisfactory, but were never drawn to a temper and he said that a great many automobile springs were turned out at his place.

We are inclined to believe, however, that a spring upon which the temper has been properly drawn is the only one that is properly made. The following items regarding the tempering of auto springs will be of material assistance in doing this work:

After welding each leaf I give it its proper shape. I then clamp a bolt in the vise long enough to accommodate two leaves, using a ring nut on bolt; then place main leaf of spring on bolt and heat the next leaf to a cherry red; place this on first leaf and tighten nut; grip the leaves with tongs at tips and dip them in soft water until cold. After the springs have all been treated, draw temper over forge and heat to a black heat and lay aside. This is a little complicated, but will stand the severest road test.

Another smith reports that many springs come to a shop for welding which show that they have been simply tempered by merely cooling in oil from a good red. This man suggests hardening in oil and then drawing to a single flash and tested.

Another smith who has had considerable experience in the repairing of automobile springs tempers them as follows: He heats the entire leaf to an even heat for the whole lengths, then cools them in oil and flashes them off once. If the fit is not perfect, he peens the leaf while hot to get the right shape. This man says that if you use the best steel and temper correctly, your springs will hold up well. Inferior steel is absolutely useless and will not stand up. He recommends vanadium as the proper kind for automobile work.

SERVICE BUREAU.

The Automobile and Automobile Troubles

OLIVER STONE.

I will admit, as thousands of us smiths must, that we are up against it and there's no use to cuss and growl and cry about it. The "dear little auto" has rammed it's nose into our shop and has torn Helen Six bits out of the shoeing business. With some to a greater extent than with others; but it is done and it is up to us to get down on our backs and go to it.

First—Don't get the backache if you fail to get "her" going. Stop and think and then try again.

The first car I worked on the owner showed me the cause of the trouble. I went after the cause and got a dollar for two hour's work. All I had to use was a screw driver and a key puller.

I have been taking THE AMERICAN BLACKSMITH for some time, but have given the auto repair talks but little thought until now. I have read and re-read the articles I find on auto repair. We have two regular garages

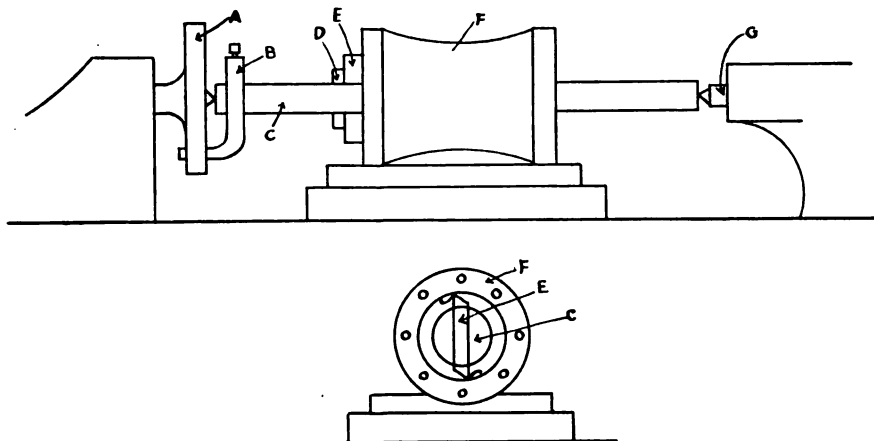


in our town and I spend my Sundays in one or the other. I have seen nine cases out of ten run in there and the owners get out of their cars with an expression on their face as if they had swallowed the wrong medicine. They say to the mechanic, "Say, this car is on the bum." And the mechanic will inquire

tion:

Arrange four pumps onto one pipe. Let one pump leak air and that one pump will throw all the others out. You must understand that gasoline goes to the carburetor, then into the engines by suction.

I have been in the garage and seen the expert cuss and swear at the



HOW THE CYLINDER IS BORED IN THE LATHE

"Don't spark? No power?" One fellow after these questions were asked him) said, "The damned thing has fits."

Now, when a car comes to you, start it up, get up in the seat, screw down on the valve of the carburetor; listen to the engine and if you can get it to going differently, (to the good) running fast, but not racing, you will know you have hit part of the trouble. After you have that settled, speed it up and if it misses (if it's a Ford) take off the timer and examine where the roller runs. If uneven, there is your other trouble. Now look at the roller, if it is uneven, put in a new one. Now try your spark plugs—if you find one failing, go to your coil box. Look between the spring, where it generates the spark, if sparks fail to appear, some trouble there. See that the primary and secondary posts are solid. If they are loose there is some more of your trouble.

Next, if your carburetor does not seem to adjust itself right, unscrew all your spark plugs, if you have a compression tester, test each cylinder. The cylinder that has the least compression is the cause of the carburetor not working right. In other words the carburetor is all right on the tight cylinders, but the loose one, the one with least compression does not suck enough gas as the tight cylinders, and therefore the flow of gas is uneven, and so in your cylinder, stop and study on this matter a little, here is a demonstra-

innocent carburetor, when (as green as I am at the business) I could have told him his trouble. This I am telling you is fact because I have worked on several jobs with carburetor trouble and have tested the cylinders and after I had put in new rings the carburetor worked right with valves in good order. I'll admit I have seen carburetor trouble on cars just from the factory, but the trouble was to adjust it to suit the atmosphere and on account of the cylinders being tight, otherwise the carburetor was O. K.

The Automobile Repair Shop

PART III.

By "AUTO SMITH."

The reader of these articles will no doubt now be very anxious to read something with reference to the actual repair work on an automobile. We have detailed the equipment which the average automobile smith will find necessary in order to do automobile repair work. We have also given a few suggestions on the business end so that a profit may be assured you in this work. Now a general word with regard to the actual repairing of the car will no doubt be most timely.

The first thing that the automobile smith should thoroughly understand before he even touches a car to repair it, is that the automobile is a fine machine, each and every part of which is related to every other

part and when any one part of this machine fails it should be repaired and replaced in just exactly the manner in which it was originally made by the manufacturer. In other words the greatest possible care should be exercised in repairing any part of the car to see that the parts replaced are the same length and other dimensions as they were originally. Of course, the reader will understand from this that it is the governing dimensions of such parts that are replaced should be the same. For example, suppose a rod of some kind is to be replaced on the car. Unless this rod works through a sleeve, the governing dimensions in this case should be the length and this dimension should be exact though the new rod may possibly be a little larger or smaller in diameter than the old one. However, if the rod is working through a sleeve the automobile repair smith will need to be more exacting and to observe carefully both the length of the rod and its diameter.

In ascertaining the length of any broken piece which is to be replaced on the car, join the broken parts together and measure them very carefully between the points where you want to make the repair. If the broken part has projecting ends, the dimensions will have to be taken very carefully from several points and these dimensions are best checked up carefully once or twice. Of course, if a slight error is made in measurement and the repair piece is made too long, it can be upset or if it is a bit short, it can be drawn out. It is best, however, in all cases to get your measurements exact and to work to them exactly, as additional work on a piece, when it is apparently finished, adds to the cost both in time and labor.

In some cases where a break is to be repaired on a car, it will be found impossible to make a weld. To repair a piece of this kind, a sleeve can generally be employed and if this is put on hot over the broken part and then bolted or riveted, it will usually be sufficiently strong to operate for some time. Where a rod or part can be welded, it is, of course, of vital importance that the parts so welded be of the same length as before the break and it will therefore be necessary for the automobile smith to insert a piece to make up for the metal usually lost in scarfing and welding. If no great amount of strain is exerted on the part repaired, it can, of course, be

drawn out to proper length.

There is perhaps no line of repair work that will so thoroughly tax the ingenuity of the automobile smith as the part requiring the replacement and repair of broken parts of the motor and transmission sections of the automobile. The repairman can hardly have enough experience to cover all of the repair jobs that he is likely to be called upon, for even after years of doing work of this character, he will find that practically every job he is called upon to do is one distinctly different than any he has ever done before and he will have to figure out things for himself in practically each and every case. The automobile smith will therefore, find that cleverness and ingenuity with a well-founded mechanical knowledge will be of more real aid and assistance to him in automobile repair work than length of experience.

Perhaps the most difficult class of repairs which the automobile smith will be called upon to do are those requiring adjustments of the various car mechanisms that have to do with the running of the car and efficient operation of the motor. It is only careful study and experience that will enable the beginner to correctly locate the motor troubles and certainly a correct diagnosis is of first importance before the remedy can be applied. In the correction of these troubles the smith's experience with the gas engine will aid him very materially. However, he will find a number of devices used in connection with the automobile motor with which he is not at all familiar. These he will be called upon to repair and adjust and it is these devices and attachments with which he should take particular pains to familiarize himself, both by reading and experience so that he can include all parts of the automobile in his repair work.

In order to go about the correction of motor troubles in a systematic way a careful study of the accompanying chart is suggested. If the suggestions on this chart are followed in the order in which they appear, troubles in the motor mechanism can be more quickly found and applying it's principals, a number of times, the automobile smith will naturally fall into certain methods and be thus able to adjust motor troubles correctly and efficiently.

Chart for Locating Engine Troubles

NOTE—First turn the engine over slowly and notice carefully the occurrence of events. Begin at the top of the chart and work down. Does the engine start easily? If it does look for your trouble in the second part of the chart. If it starts with difficulty consult the first part of the chart.

Part One.—Troubles in Starting

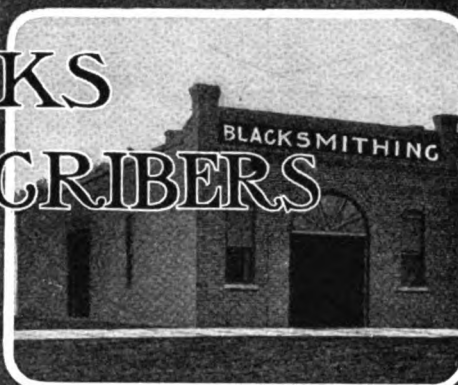
A—Ignition	1—Battery	Loose wiring. Test cells—discard all below six amperes. Test storage batteries for voltage.
	2—Magneto	Poor contact. Commutator dirty or oily. Driven too slow.
	3—Spark Equipment...	Vibrator stuck or out of adjustment. Spark out of time. Spark points sooted. Spark points too far apart. Defective or broken plugs.
B—Carburetor ..	1—Lack of fuel.....	Empty fuel tank. Needle-valve clogged. Fuel passages clogged. Water in fuel tank or carburetor.
	2—Faulty mixture of air and gas...	Too rich. Too weak.
C—Motor	1—Cold cylinder.....	
	2—Valves out of time..	
	3—Poor compression...	Worn piston rings. Valves do not seat properly. Leaky cylinder gaskets.

Part Two.—Troubles After Starting

A—Misfiring	1—Ignition	Short circuit. Weak batteries. Defective coil. Faulty connections. Foul spark plugs.
	2—Carburetor	Lean fuel mixture. Fuel supply low. Water in gasoline. Stale Gasoline.
	3—Motor	Cold cylinder. Poor compression.
B—Pounding ...	1—Spark too early....	Spark lever incorrectly set.
	2—Pre-Ignition	Short circuit in contact maker. Cylinder overheated. Carbon deposit in cylinder.
	3—Looseness	Connecting rod bearings. Main shaft bearings. Flywheel.
C—Back firing ..	4—Hot Bearings.....	Want of lubrication.
	5—Tight or Seized Piston	Clogged water circulating system. Want of lubrication.
	6—Broken Parts.....	
D—Explosions in muffler ..	1—Late Ignition.....	
	2—Weak mixture.....	
	3—Pre-Ignition	See B-2 above.
E—Over-Heating	4—Inlet valve.....	Leaky scored seat. Weak spring.
	1—Weak Ignition.....	
	2—Irregular Ignition	
F—Loss of Power	3—Weak mixture.....	Loose connections.
	1—In Cylinders.....	Late Ignition. Mixture too rich. Insufficient lubrication. Insufficient cooling water. Clogged water system-pump or radiator. Poor compression.
	2—In Bearings.....	Lack of lubrication. Too tight.
G—Smoke	1—Ignition	See A-1
	2—Carburetor	See A-2
	3—Overheating	See E-1 and E-2.
H—Irrregular speed	4—Leaky Compression..	Scored valve seats-weak springs-bent stems. Piston rings sticking or worn. Cylinder gaskets leaky. Clogged.
	5—Exhaust	
	1—Black smoke in exhaust	Mixture too rich.
I—Irregular speed	2—Light bluish smoke.	Too much lubricating oil.
	1—Irrregular Ignition..	Weak batteries. Loose wiring. Foul spark plugs.
	2—Irrregular Fuel supply	Clogged fuel pipe. Fuel low. Dirty fuel valves.
J—Irregular speed	3—Valves	Weak springs. Bent stems. Scored seats.



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The Value of Back Numbers

While on the subject of what our Subscribers' Service Bureau is doing for subscribers, we want to remind our readers of something that will save them considerable time in the solving of many of their shop problems. While the Service Bureau is always willing and anxious to help a reader whenever he feels that he needs help, many of the questions asked are found upon investigation to have been answered in some previous number of "Our Journal." We have several times pointed out the value of back copies and have also published letters from readers emphasizing this fact; but there are still some of "Our Folks" who do not seem to realize that simply because copies of THE AMERICAN BLACKSMITH are published on a certain date or bear the name of a certain month that the value of that paper does not necessarily end with the end of that month. Many of our readers bind up their copies regularly each year and quite a number of them have bound volumes containing every number that has been published. When you realize the hundreds of practical items, labor-saving articles, time-saving methods, that are published every year, you must realize that a few volumes of this practical journal must necessarily be of inestimable value and help to the practical man.

Let us carefully consider then, the practical value of the back numbers. Don't think your copies are of present value only. Keep them for reference and you will find yourself the possessor of a library jammed full and overflowing with practical smith-shop information.

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Our Coming Shop Number

For a number of years now the Shop Number of THE AMERICAN BLACKSMITH has been a regularly looked for issue. To make it interesting, valuable and practical, it is necessary for us to depend upon our readers and subscribers. We want to make the shop number for 1916 the biggest, best and most useful number that has yet been published. We want you to send in pictures of good shops, pictures of well-equipped shops, pictures of well-built shops. We want floor plans, shop lay-outs and descriptions of good equipments. We want descriptions of shop-made tools and shop-made machines. We want descriptions of labor-saving devices, handy tools and time-saving equipment,—in short, we want your help in placing before our readers just as many items and descriptions of blacksmith shop devices as we can possibly find room for.

We want this Shop Number to be just exactly what its name implies—a number devoted principally to the description of devices, machines and tools that make the shop work easier, better or more profitable. Look about you now and see just how many items of your equipment you can describe for this number. Remember, what may be old and commonplace to you, may be new and distinctly novel to some other reader.

The Booster's League

This was suggested by us several years ago. It is merely a league of staunch, whole-hearted smiths who have given their word to boost the craft at every opportunity. There is no initiation fee, no membership charges, simply your word to say you will boost every chance you get. Are you a member?

If ever the smith craft needed boosting, it does right now. It needs a boost from those men who are credit to the trade. It needs the boosting of the real smiths in the the craft. It needs boost of those men who are thoroughly efficient as blacksmiths and as business men. It needs your boosting, Mr. Reader. Right now when the craft is going through an evolution that promises to be one of the most importon and one that will bring about the great change in it's history—the craft needs the boost of men who are not afraid to look ahead—who are not afraid to figure on the future—men who will grasp the opportunities that they see presented. Are you ready to join the B. L. and subscribe to these ideals?



WILL THEY SOLVE IT?

The problem of finding a Comfortable Living in these days of Advancing Costs, Keen Competition and the Rising Cost of Living is one that is before every smith. The solution of the problem depends upon the Individual Smith. Some smiths have solved the problem by accepting the proffered aid of Auto and Tractor Repairing. Others are accepting conditions as they find them. Which is most likely to feel the sting of Smaller Profits, Less Money, Failure and Bankruptcy? Which is most likely to experience the feeling of comfort that goes with Increased Profits, More Money and a Bank Account? Are you pushing up your prices every time your costs advance. Or are you getting the same old prices you got five years ago? Are you considering the offered "help" of Auto and Tractor Repairing?



Welding Sheet Metal With the Oxy-Acetylene Torch

J. F. SPRINGER

WHEN sheets of metal that are less than $\frac{1}{4}$ inch in thickness are to be welded, the procedure is frequently more or less different from the usual methods of uniting heavy pieces. When ordinary thick pieces are to be welded, it is customary to prepare the edges by beveling. The beveling may be done from both sides of both pieces or from one side of both pieces. These grooves are V-shaped and it is required that the angle of the V shall be not less than 90 degrees. This is the general rule for heavy work. But with thin work, it is permissible to depart more or less from this rule. We are allowed to make the groove sharper than 90 degrees. With quite thin metal, we may even dispense with it altogether.

The Object of the Groove

Perhaps the best way to learn how to judge the matter is to consider the object sought in having a groove. The main thing in view is to get the heat down into the metal. The little white flame with which the work is done is quite short, so that with thick work it is rather necessary to lay the metal open so as to have working room. A V-shaped groove of 90 degrees just about does this comfortably. But where the metal is thin, we can often make the heat penetrate without a wide groove. There are a number of things which seem to enter into this matter—the length of the white flame with which we are at the moment working, the pressure back of this flame, the thickness of the work, the heating power of the flame. If the operator knows precisely what he must do in order to get a good weld, then he should be able to judge whether he is getting the right result. The thing to be sought is a high heat—almost to the melting point—all over the edges which are to be united. With quite thin metal or with a powerful torch, he may be able to get the proper heat *without the flame actually touching all points of the edges*. A good deal of thin welding is done with the

edges not only unbeveled, but tight up against each other. Heat penetrates into metal. When the operator sees that he is undoubtedly getting sufficient heat to the point of actual use, nothing else is necessary.

Welding Without Rod

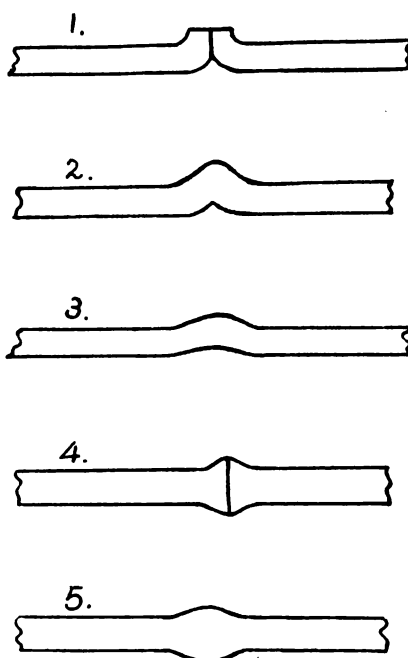
Now when we narrow the groove, we also reduce the amount of new metal that needs to be added. This is to be regarded as an advantage, because the less new metal the operator has to give attention to, the

the advantage of releasing one hand of the operator from the necessity of holding welding rod. In short, wherever a flame of ample size and pressure is employed, we will usually be able to weld all kinds of steel sheets from the thinnest up to $\frac{1}{4}$ inch size *without welding rod*.

Preparing the Edges

Suppose the steel plates are not thicker than, say, $\frac{1}{16}$ inch. We may simply bend up the edges so as to produce the form of joint shown in Fig. 1. How much we turn them up depends upon two things—first, the amount of metal needed to fill the crevice, and second how much we want to add in order to provide the strength of joint desired. This bending up operation should be done with care, so as to provide two edges (one on each sheet) that will fit pretty closely to each other when put together. The welding operation will properly consist in melting down ridge and at the same time getting a high heat all the way through the joint. If there is uncertainty as to the heat penetrating all the way, the torch may be applied to the other side as a second operation. It will ordinarily happen that the prepared edges will be rounded on the under side of the joint. This will be a consequence of bending the edges. If the welding is done in a single operation by simply melting down the double ridge and causing the heat to penetrate, there will remain on the under side a depression or groove due to the rounded edges. See Fig. 2. The second operation of running the torch along this groove may frequently be made to reduce its depth, but we can not count upon its complete removal in this way. There is a lack of material to fill up the groove. See Fig. 3. It may very well be that a result of this character will be unsatisfactory. Nevertheless, there will often be cases where it will be quite suitable. The thing to do is, of course, to use this form of joint only where the results are satisfactory.

Instead of bending the edges, we may upset them. This should be

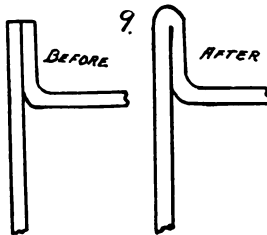
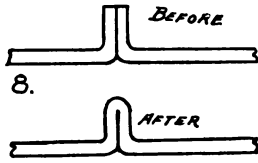
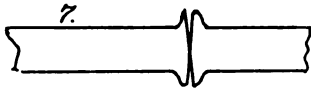
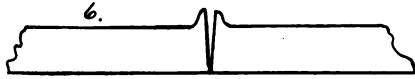


FIGS 1 to 6.—SHOWING SEVERAL OXY-ACETYLENE WELDS

more he can put his attention on the business of seeing that the welding action is taking place properly. In ordinary thick work, the operator must hold welding rod in one hand and the torch in the other. With work where he does not need welding rod, one hand is free. Sometimes with work thin enough to justify a narrow groove, but still thick enough to require some groove, the extra metal required for the filling up of the groove is provided for by the *form given to the edges* of the work prior to welding. When this can be done satisfactorily, we get



very carefully done so as to produce even edges to put together. The upsetting may be done in such a way as to produce on either edge a ridge above and below. When brought together, we shall have a joint resembling that shown in Fig. 4. This form calls for treatment on both



FIGS. 6 to 10—SHOWING SEVERAL MORE METHODS OF WELDING SHEET METAL

sides of the work. That is, we should operate the torch along the upper side of the work melting down the double ridge on that side and getting the high heat to penetrate *more than half way through*. Then we should turn the work over and melt down the other double ridge, again getting the high heat more than half way through. If these operations are carried out as described, we may expect very satisfactory results, especially in respect to the strength of the weld. We should not be careless about making sure that a high heat is penetrating. If we do not heat the parts in actual contact at all points up to the welding temperature, then we can not expect the metal to unite. The welding temperature required in oxy-acetylene work is higher than that employed by the blacksmith when he does welding in the old way by the use of a hammer. The temperature must be quite high—near the melting point.

Make the Edges Straight

In bending over the edges or in upsetting them, the smith should consider how best to carry out the

work so as to get even edges for the contact when arranging the joint. Some suggestions are offered along this line, which may be found useful. It would seem that two straight edges of heavy metal might be placed one on either side of the work to be bent and all three put into the vise. The edge of the work can then be allowed to project exactly the right amount. A similar procedure may be found useful in upsetting. As, in both cases, we have to prepare a new edge for contact, it may be best not to strike the work directly with the hammer. A block or strip of steel with a good, straight edge may be used against the work. The hammer will then be employed by striking the block or strip. But the ingenious blacksmith may think of some better way.

Thicker Work

In the foregoing, we have limited the procedures to rather thin work, suggesting 1/16-inch as the thickest. The smith may very well find, however, that he can handle work twice as thick in the same way. Where the sheets or other work to be united is still thicker—that is, between thicknesses of 1/8 and 1/4 inch—it will be advisable perhaps not to rely too much on the high temperature penetrating through the metal, but to provide a narrow groove.

When the edges are being prepared to furnish a groove, upon being brought together we may usually at the same time take care of the necessity to provide for the excess metal necessary for filling up the groove and even for adding to the general thickness. That is, we form the edge in such way as to dispense with the welding rod. In Fig. 6 is given an example of a joint whose edges have been beveled and also made to provide the excess metal. It should be borne in mind that the size of the groove and the size of the ridges provided must be related to each other. The metal from the ridges is what fills the groove. It is better, ordinarily to have too much than too little. Usually, it will probably be better not to be over-generous in widening the groove. The wider the groove, the more metal has to be put into the ridges in order to have enough to fill up the groove. The object of the groove is, of course, to secure penetration of high heat by opening a way down into the metal. The operator may have to be somewhat more careful than he is with ordinary welding, because he has only a narrow groove. He must see to it that this groove is utilized. The

ridges of excess metal are at the top of the groove, one ridge on either side. If this metal does not of itself flow down into the groove, the operator must so handle his torch as to drive or guide it in. When he has finished work on one side, the whole may be turned over and a second treatment be given the joint from the other side.

The operator may, if the sheets are rather thick—that is, pretty close up to 1/4 inch—put a double bevel on each edge. See Fig. 7. There will then be two narrow grooves, one on either side. The ridges may be arranged as before. There will now be four ridges, two on the upper side of the work and two on the under side. The grooves will now be only about half as deep as before, and this may prove advantageous. The operator will, of course, have to weld on both sides.

Same Metal in Weld and Work

It is one of the great advantages of oxy-acetylene welding in general that it permits the joint to be made with the aid of the very same material as the work. The reason this is an advantage turns on the following principle: If two *different* metals are placed in contact and then exposed to the wet, an electrical activity is brought about which results in the damage of at least one

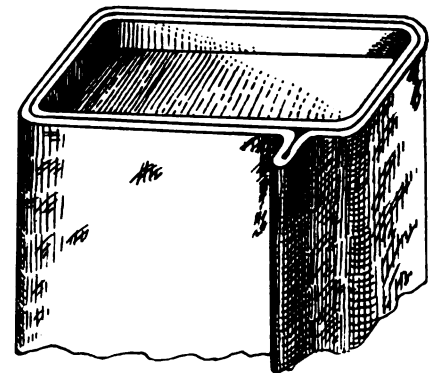


FIG. 10.—THE WELD IS NOT MADE AT THE CORNER

of the two metals. The scientific name for this action is *electrolysis*. It may operate slowly, but it operates surely. A weld made with a distinctly different metal is pretty sure to deteriorate, unless it is protected constantly from damp and wet. Here we have a reason why oxy-acetylene welding may be done in such way as to be better than soldering or brazing. In oxy-acetylene welding, we are able to use the very same material in the weld as is in the work. If we join two sheets of steel, we may use steel to make



the joint. If we join two sheets of steel, we may use steel to make the joint. If we join two sheets of aluminum together, we may use aluminum in the weld. Now this brings us

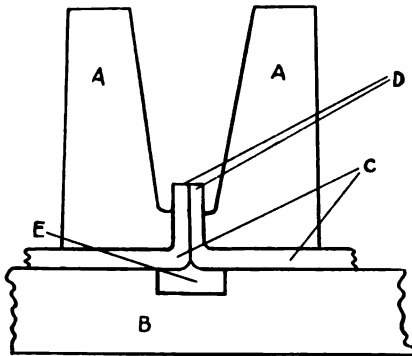


FIG. 11.—WELDING A SHEET METAL SEAM: A, A, CLAMPS; B, TABLE; C, WORK; D, EDGES TO BE WELDED; E, AIR SPACE, MAY BE FILLED WITH ASBESTOS

to the following point: Whenever we weld without any welding rod at all and make the work supply the metal for the joint, then we are absolutely sure to have the very same material in the weld as in the joint.

Welding to get Tightness

Oxy-acetylene welding is done with one of two principal objects in view—either to make a strong union of two parts or else to make a tight joint regardless as to whether the weld is particularly strong or not. Let me cite an interesting case of the latter purpose: Some years ago, one of the large concerns building steel passenger coaches made use of the oxy-acetylene process for the purpose of closing the joints between steel sheets in the roof. Strength was not sought especially. It was watertightness that was wanted. The sheets were riveted to supporting T-bars, so that a strong joint was effected by this means. But riveting alone could not be depended upon to produce a joint sufficiently tight. So, the oxy-acetylene torch was applied and the crevices filled up.

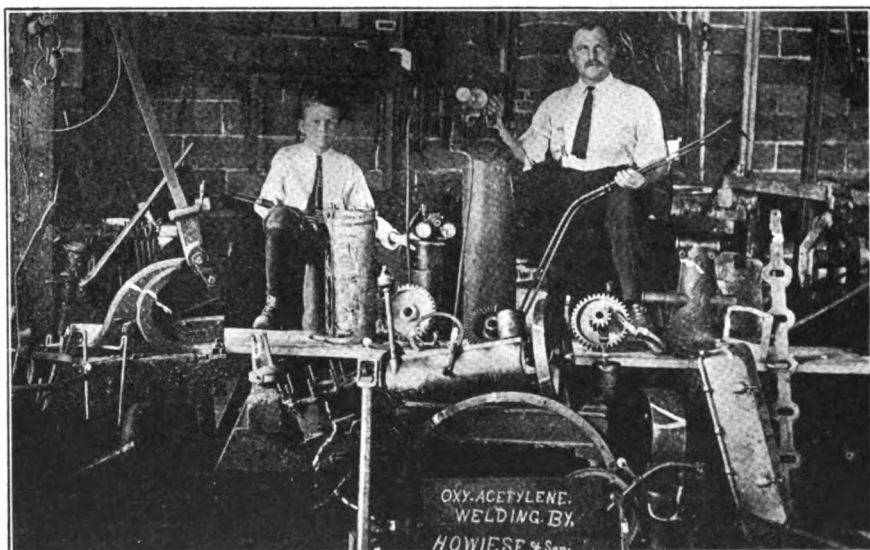
Another instance of oxy-acetylene welding of thin sheets of steel by the same concern was the following: It was necessary to use absolutely flat sheets in the ceiling of steel passenger coaches. If sheets whose surfaces were buckled or not exceedingly flat should be employed, an unpleasant appearance would be created when the ceilings were in place and given a shiny coat. The action of the light reflected from them

would disclose the uneven condition. Now it so happened that flat sheets of the right size could not well be obtained; but it was possible to get smaller sheets of such size that two together would answer. The plan of using two sheets meant, however, making a joint which would be in a very conspicuous situation. The making of these joints by the oxy-acetylene process was carried out with success. Probably the *strength* of the joint was a small matter. The perfection of it was, however, everything. After the welding, these joints had to be smoothed over so as to have no excess metal on the one side. The Plates were kept from buckling by gripping the two sheets very tightly by means amounting to the equivalent of two vises. Each sheet was held just back of the edge in a very severe grip. As I recollect what I saw in the shop, there was a metal table on which the two sheets were laid and very heavy and broad pieces of metal were placed on top of the sheets, one to either side of the joint and made to grip the sheets. Now the blacksmith may not have all of these appliances, but he will perhaps have use for in welding sheets. Here is one thing that may prove quite useful to the smith. The steel table and the broad clamps would operate to carry off all the heat that would seek to travel from the torch back into the work. Probably no appreciable amount of heat

purpose of holding sheet metal for welding, do not use narrow strips; but do use broad heavy pieces. Such pieces act as absorbers of heat, preventing it from getting into the main body of the work.

Air Space Under Joint

However, it is not a very good idea to have metal immediately under the joint itself. If you lay the sheets which you are going to weld together upon a metal surface, it will be well to have the metal cut away just underneath the joint. The amount to be cut away will depend upon the thickness of the sheets which you are going to weld together. The thicker they are, the wider the cut-away portion should be. Instead of cutting away metal, it may seem more convenient to use two heavy sheets or slabs, laying them with a broad crack between. The reason for having no metal underneath the joint is this. When the torch is applied, the heat is directed down onto the joint from the upper side. The effort is to get sufficient heat through the joint to make the weld possible. If cool metal is underneath, it will carry off heat as you try to pour it in. If something seems necessary right under the joint to support the edges of the work, the crevice in the table may be filled with asbestos put in in such a way as to provide a good, solid support. Asbestos is suitable, because it won't burn and won't carry off the heat.



MR. H. O. WIESE AND SON ARE OXY-ACETYLENE EXPERTS. THEY DO ALL KINDS OF WELDING

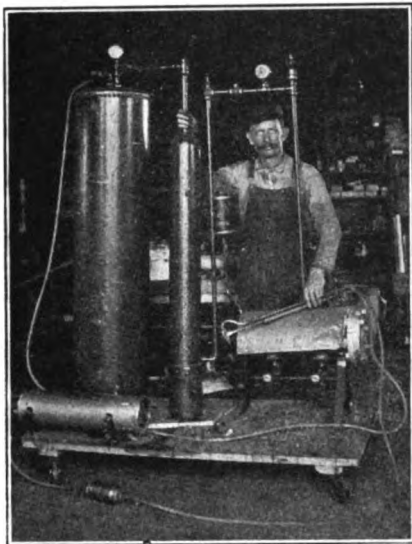
ever got back of the clamps where the main part of the work was. The lesson to learn is: When you use clamps or pieces of metal for the

Lessons From a Notable Example

I have already remarked that the oxy-acetylene process is sometimes used for the purpose of getting



tightness in cases where strength was not much in view. Also, I gave an illustration or two. The welding operator should consider whether strength is desired. If not, he may sometimes make a very advantageous joint. A case of this occurred in connection with the manufacture of the containers used for the Edi-



OXY-ACETYLENE PLANT BUILT AND OPERATED BY DAN LIND OF WISCONSIN

son storage battery. The containers are metal cans standing on a square or rectangular base. The material is sheet steel which has been nickel plated. The containers must retain within them a liquid, so that tightness of the joints is especially necessary. Strength is a secondary consideration. There is one long and straight joint running from top to bottom. Then there is the joint around the base where the bottom piece is secured. The joint at the top is similar to the one at the bottom. All three joints are welded without the use of welding rod. The joint down one side is of the type shown in Fig. 8. The top and bottom joints are represented in Fig. 9. One end of a container is shown in Fig. 10, where it will be noted that the top (or bottom) is concave and is set in. All these joints are made by melting the two thicknesses of metal and allowing the melted material to run together. The torch is not manipulated at all, but held in a fixed position. We may get one or two important lessons here. Note that the up-and-down joint is not put right at a corner, but a little to one side. This is important, if the joint has to stand any effort to spread the corner. In the present case, there would be something of such an effort

when the container is first filled with liquid. The pressure of the liquid (due to its weight) would tend to make the angle inside the corner a little wider. The movement would be quite small, but, big or little, its bad effect would come on a weld if that were located in the corner. At any rate, it is best to remember the rule: Never locate the weld of sheet metal in a corner. Another important lesson derivable from the methods of welding used with these cans is the following. When the weld of the long, upright joint is made, the can is held so as to have the edges horizontal. Two heavy pieces of metal are arranged, one to either side. These form a kind of steep valley—a canyon—with the joint at the bottom. See Fig. 11. The metal pieces extend the whole length of the joint. In the present case, they are used partly to hold the two parts of the joint together in proper position. But they serve another purpose, and one which the blacksmith doing welding of sheet metal should ponder. Let me explain. The torch is held at an angle of about 45 degrees, the newly welded part of the joint being underneath. The big flame of the oxy-acetylene torch fills the bottom of the "canyon" both to the front and to the back of the point at which welding is at the moment going on. That is to say, the result of directing the torch at an angle of 45 degrees and at the proper distance for welding has the result of splitting up the large flame into two parts. One streamer, accordingly, lies along the edges which have already been welded; the other streamer lies along the part of the joint which has not yet been welded. The effect is a very good one in both cases. Where the freshly welded edges are covered, they are protected from oxidation while cooling. To the smith this is perhaps not of much interest. The streamer which lies on the edges which are still waiting to be welded is heating them up. When the little white flame which does the intense heating comes over a new spot, it finds its work partly done. The edges are already hot—not nearly as hot as they need be, but still good and hot. The result is time and money saved. The lesson for the smith is this: Whenever there is a considerable number of straight joints to weld, it may be practicable to arrange guides to either side of the joint which shall form a "canyon" and thus permit the moving torch to have the big flame lie on the part of

the joint ahead. When this can readily be done, the smith will find he can make better time than would otherwise be the case. In this way, the heat of the big outside flame of the oxy-acetylene torch is made to perform a useful service. The user of the torch has to have the flame. If he can manage his work so as to make it do some of the heating in advance of the real working flame, he is that much ahead. Instead of letting all this heat go to waste, he is getting the good of some of it.

Several Oxy-Acetylene Welding Jobs and How They Were Done

C. G. W. CRUDEN.

The blacksmith or intending operator of an oxy-acetylene torch never knows the wide range of work he can do with his outfit until he gets it in the shop, tries it out and then has jobs put up to him that he never thought of doing before.

Gear wheels have for years been repaired by blacksmiths (that is by

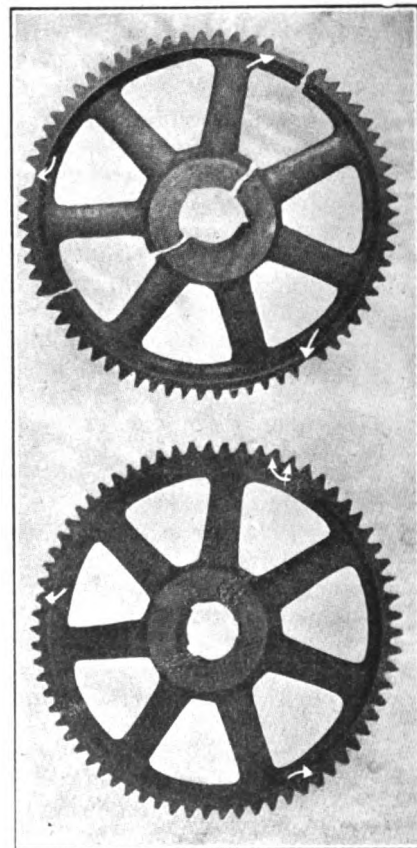


FIG. 1.—RESCUED FROM THE SCRAP PILE BY THE OXY-ACETYLENE TORCH

those smiths who knew how to do brazing) by brazing in the teeth that have broken off and by brazing the broken wheels together. But



brazing has always seemed more or less of a knack to many smiths. With the oxy-acetylene torch, a broken gear wheel is just as easy to repair, when the principles of oxy-acetylene welding are understood, as welding a toe calk on a horseshoe.

In welding by means of the oxy-

less time than the preliminary operations. The welding of the break was done first, then the missing teeth were put in. These were replaced by building up the teeth with a rod made of metal as near like the wheel as possible. The teeth were built up somewhat larger than necessary and then cut down to size.

In Fig. 2 is shown a crank shaft job similar to one we had in recently. A crack developed in the crank shaft and before allowing it to go any further the owner of the car brought it in. The crack was chiseled out as shown at A, the crank placed on the welding table and the immediate parts of the crank thoroughly pre-heated. The actual weld was then made.

It is, of course, understood that welding rods of as nearly the same composition as the parts to be welded are used. This insures a weld of a strength as near as possible to the original piece.

In Fig. 3 is shown a job that appeared rather difficult when it was brought in. The cylinder had a hole punched through its end. The water jacket was not harmed however. To get at it from the inside was rather difficult not to say impossible. Therefore, a piece was deliberately cut out of the water jacket. This piece was somewhat larger than the hole in the cylinder so that the patch could be made with as little difficulty as possible.

In doing this job the entire cylinder was carefully pre-heated before welding. After pre-heating the cylinder patch was welded into place and the water jacket was then repaired. In this way a cylinder that would otherwise have been scrapped was saved and the cost of a new cylinder saved.

And speaking of costs and savings here are a few examples of savings made with the help of the oxy-acetylene torch. An automobile transmission case was broken. Its value, judging by the cost of a new one, accordingly to catalogue listing, was thirty-two dollars. The cost of the repair was about \$1.45. The charge made was fifteen dollars.

In another job, that of a broken crank case, the case was figured at ninety dollars; the cost of repairing was about \$4.60 and the owner of the case was charged twenty-five dollars.

Another job, that of a broken casting for a machine in one of the factories. The machine itself cost in the neighborhood of seven hundred dollars. The part broken could

perhaps be replaced at a good deal less than that figure, but the delay in waiting for the new part would perhaps amount to three or four days at least with the possibility of the time lengthening to a week or ten days. The work was done right in the factory. A few small parts had to be removed from the machine, but, in three hours from the time of notification the machine was ready for operation. In this case the cost of the job ran somewhere about in the neighborhood of twelve dollars—the price charged was fifty dollars.

These charges may at first thought seem excessive and bordering on the

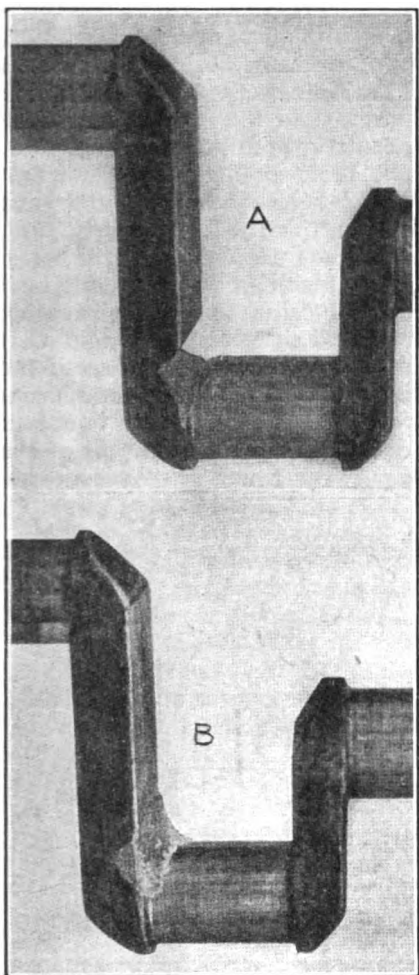


FIG. 2.—ANOTHER JOB FOR THE OXY-ACETYLENE TORCH

acetylene torch it must be remembered that iron, and steel expand and contract under the influence of heat and cold. Therefore, this contraction of the metals must be taken into consideration when welding with the oxy-acetylene torch.

To weld the gear wheel shown in Fig. 1, the two broken parts were first prepared by forming the necessary V by beveling the edge of each break on both sides of the wheel. Enough was left of the broken surface to fit the two pieces together. The parts were then placed on the welding table and carefully fitted together. A hood lined with asbestos was then used to cover the wheel and the pre-heating torches started. When sufficiently heated it remained but to do the welding which took

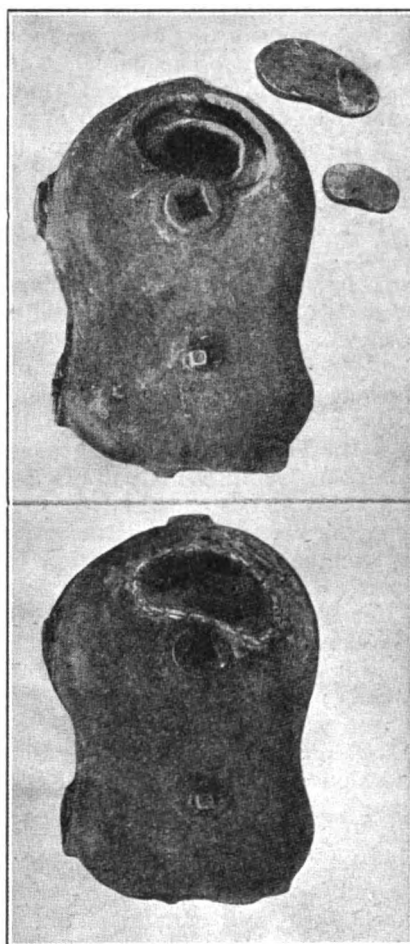


FIG. 3.—A CYLINDER THAT WOULD HAVE GONE TO THE SCRAP HEAP

“robber” order but—in each case the owner was given to understand that had we not had an oxy-acetylene torch he would have had to purchase a new part at a cost of from three to five times as much as our charge. It was pointed out that our charge was not an expense, but that we were really saving him money. Of course, some people always hate to see anyone else making any money even though they



themselves are making a big saving. With people of that kind, I am inclined to charge still more than usual.

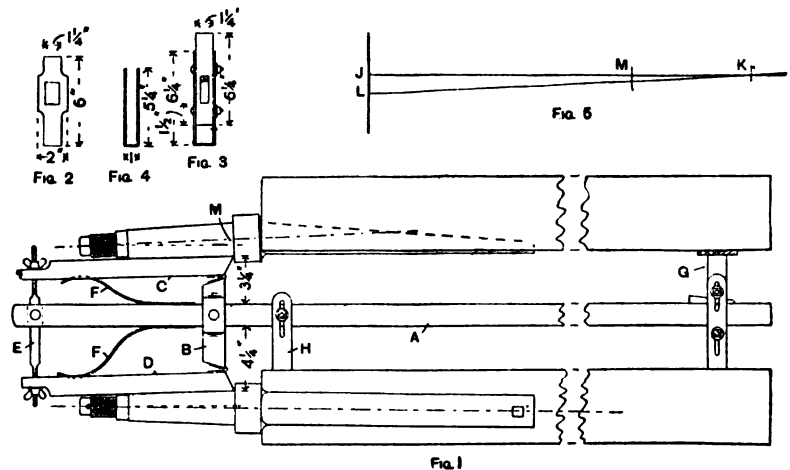
An Axle Gauge and How to Use It

R. H. LOMAS.
(In Work.)

When bedding axle arms, it is best to work to a gauge set to give the correct amount of "pitch" and "gather", such as the one shown applied to an axle in Fig. 1, which embodies several improvements. The gauge may be made from hard wood, such as birch, thoroughly seasoned. The stem A is 6 ft. long by $1\frac{1}{2}$ in. by 1 in., reduced to $\frac{5}{8}$ in. thick at the end opposite to the screw for a distance of 2 ft. The bar B, 6 in. long by $1\frac{1}{2}$ in. wide by 2 in. thick, is mortised for the thick part of the stem to pass through as shown by Fig. 2, a $\frac{5}{16}$ -in. bolt being used to fix them together. The bars C and D, 1 ft. $2\frac{1}{2}$ in. long by $1\frac{1}{4}$ in. by $1\frac{1}{4}$ in., are hinged to the ends of the bar B by a pair of $1\frac{1}{4}$ in. back flaps, the ends of the bars being bevelled as shown. The double-ended bolt E is of $\frac{3}{4}$ -in. by $\frac{5}{16}$ -in. wing-nuts. The bolt is mortised through the end of the stem and pivoted on a $\frac{5}{16}$ -in. bolt. The springs F in grooves in the bars C and D. The bar G, $1\frac{1}{4}$ in. by $1\frac{1}{4}$ in., is mortised to slide along the reduced part of the stem, and can be set in any position by means of a wedge. The lower part of this bar is fitted with an adjustable extension clip, a side view of which is given by Fig. 3, made from $1\frac{1}{4}$ -in. by $\frac{1}{8}$ -in. hoop-iron, and secured with two $\frac{5}{16}$ bolts sliding in slots cut in the plate. A similar extension clip secured with one bolt is sunk its own thickness into the stem at H. Fig. 4 is a side view of this clip. To find how much pitch to give an axle arm to suit a given wheel, dish and obtain a plumb spoke, draw a horizontal line, and set off half the height of the wheel J K (Fig. 5). From J set off the dish of the wheel at L, and from the point obtained draw a line to K. From K set off the length of the axle arm on line J K, as at M. The distance between lines J K and L K at M is the pitch required at the centre of the arm, as at M (Fig. 1). Assuming the height of the wheels to be 4 ft. 4 in., the dish $1\frac{1}{4}$ in., and length of axle arms 8 in., the pitch will be $\frac{7}{16}$ in. bare; but the true pitch underneath a tapered arm will be half the taper less than this. If

the arm has $\frac{3}{8}$ -in. taper, then $\frac{3}{8} \div 2 = \frac{3}{16}$ in., and $\frac{7}{16}$ in. — $\frac{3}{16}$ in. = $\frac{1}{4}$ in. Therefore the upper bar C must be set to a taper of $\frac{1}{4}$ in. in a length of 8 in., which is done by applying a straightedge extending across bars C and G, and adjusting bar C by the wing-nut. As the arms project a little underneath the bed to allow the couplings a tight grip, a piece of packing the same thickness as the amount of projection is placed between the end of bar G and the axle bed, as shown in Fig. 1. Axles with tapered arms require setting with $\frac{1}{16}$ -in. gather, so that when seen in plan the wheels run slightly closer together at the front than at the back. The lower part of Fig. 1 shows the under side of an axle and bed with the gauge applied to the front of the arm, and the sliding clips adjusted to suit the width of the bed. To obtain the gather for the axle in question, the taper $\frac{3}{8}$ in. $\div 2 = 2 - 1/16$ in. = $\frac{1}{8}$ in. Therefore the lower bar D must be set

dead, but the founders' sons and grandsons. It is a highly respectable business and perhaps for that reason we did not investigate as carefully as we should do. It was stated to us that the business was doing about \$100 per week retail, when we bought it. The books were open to us, and we examined them to some extent, but not closely, because we had confidence in the firm and its reputation. It appears now as if the statement of \$100 per week was untrue. We have been in the store for twelve weeks, and at no time has it done anywhere near that much. Our first week's receipts were \$65, our second \$58, our third \$75, our fourth \$72, and so on, until the twelfth week, when the receipts were a trifle over \$80. We called this to the attention of the old firm, and they said wait until the year was up and see if the business would not average \$100 per week. We have no reason to expect any increase at other seasons of the year, however, and are coming to be-



AN AXLE GAUGE SUGGESTED BY AN ENGLISH COACHSMITH

backwards to a taper of $\frac{1}{8}$ in. a length of 8 in. To ensure accuracy of gather, the gauge should be tried at both front and back of the arm, when space at the back ought to be twice the amount of gather.

When You Buy a Business and its Doesn't Come Up to Claims

A New York correspondent submits the following case regarding the status of the parties as to a certain phase of the sale of a business:

About three months ago we purchased the above business from the founders. We continue to do business under the same name. The persons from whom we bought were really not the founders, who are

lieve that we have been swindled. The business is undoubtedly a good one, but since we paid \$150 for good will, we feel that we have not been dealt fairly with. The price of the business was \$650, of which we paid \$500 and gave our note for \$150, payable in four months. What is our legal status? Have we any remedy for having been told the business did \$100 when it has not done more than \$80, and sometimes is below \$60?

Cases like this are constantly arising in every State of the Union. In my own practice I am getting them all the time.

I shall say to this correspondent—though I wish I could have said it to him earlier—what I invariably say to every client who comes to me



when he is contemplating buying a business: Never take the word of the seller of any business as to what it is doing. If the deal is sufficiently important, put a certified public accountant on it with instructions to go clear to the bottom and prepare a statement covering everything—stock on hand, amount of gross business, and particularly net profits. It is astounding how many men about to buy a business lay down their money without any real data about the net profits. The gross business of itself means nothing. It is perfectly easy to build up a tremendous gross business in a week, simply by cutting prices below cost. But who would want to buy such a business? It is really a liability rather than an asset.

If the deal is too small for a certified accountant, put a good sharp bookkeeper on it, or if you are sufficiently experienced, get into it yourself. Before you pay down a penny, have the figures, gotten by your own investigation.

One reason this is important is that if you take the buyer's word, or, depending on his word, make but slight investigation for yourself, and after buying the business, find like the above correspondent that it does nowhere near what you expected it to, you will find it almost impossible to prove in court that the business did not do what the buyer said it did.

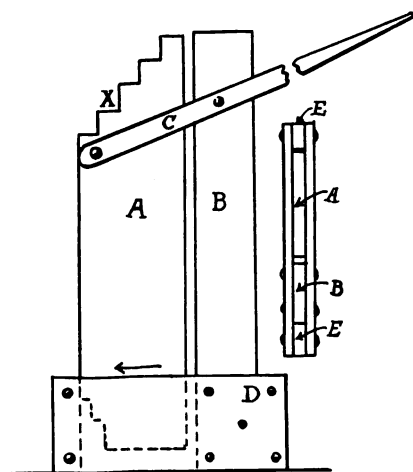
It is the law everywhere that the buyer of a business cannot prove what the business did before he got it, by figures showing what it did after he got it. That has been tried many times, and it always fails. For instance, the correspondent bought a business said to be doing \$100 per week. It does for him about \$60 to \$80, which he argues with some force, is pretty good evidence that it did no more for the seller. But the law says it is no evidence at all, for there are differing factors present, such as possible differences in methods of salesmanship, advertising and so on, which might account for the difference. Therefore the buyer is deprived at the outset of what he considers his strongest evidence. The only way he can make his proof is by producing the seller's books—which have probably been made way with long before—or some of the old employees. Sometimes he can get some of the employees to give this testimony, but oftener he cannot.

There is a Massachusetts case which lawyers who have to go to court with a case like this are fond of citing—a case between two

Greeks. One sold out to the other on the statement that he was doing \$150 per week. The buyer bought and paid largely in notes. After he got in he found that the store was not doing \$150 a week, and he refused to pay the notes on the ground of fraud. At the trial he tried to show what the store had done for him—much under \$150—as evidence of what it done before, but the court ruled it out, and the buyer, though he really may have been grievously defrauded, was left without any legal evidence at all. There was accordingly a verdict against him. This will always happen when you have no evidence of fraud except that the business you have bought did less for you than the seller said it did for him.

The only way to protect yourself against this is to get the figures first.

I will say in closing that there is nothing in the suggestion of the



AN EASILY-MADE WAGON JACK

seller of the above business that the buyer should wait a year to see if it does \$100 a week, unless the business has heavy seasons which have not yet come. The statement was \$100 per, not per year, and three months are enough to test it out.

(Copyright by Elton J. Buckley.)

A Shop-Made Wagon Jack

M. V. LEACH.

The accompanying engraving shows a wagon jack that, as far as I know, is original with me, at least I never saw one just like it. As shown, the jack consists of two upright boards, a handle, and a base. Board A is stepped out at one end as shown so as to go under axels of various heights. The lower end of this board is also notched out on one corner, as shown, at its lower end. The

piece B, simply a good, stout upright that is held solidly in the base. The handle C may be any convenient length to give proper leverage. The base D is made of two boards which run the full length of the base on each side of two end pieces EE. The section into which the piece A fits is left free so that the lower end of A will work up and down easily.

In operation with the weight on X the handle is pushed down and as the weight at X forces the lower end of A forward in the direction of the arrow, the lower end of A catches on one of the steps as it raises.

Collection Diplomacy

W. B. PARKER.

In an article on handling slow collections by mail, published in a recent issue, the writer explained an efficient and inexpensive method of renewing the interest of "Mr. Slow Pay", in the fact of his indebtedness, and of placing him in the right mental attitude to facilitate a satisfactory adjustment of his unpaid account. But when Mr. Slow Pay answers one of the letters the work of collection is only commenced unless he settles in full at the time. In practice it will be found that he will often pay an installment of the indebtedness, promising to pay the balance at a future date, or will attempt to settle the entire account in promises instead of cash. In either of these cases the right kind of collection diplomacy is needed to complete the work already accomplished in turning a poor account into a good one.

In order to intelligently decide on a plan of action in any given case, it is well to remember that there are just four general classes of slow debtors, and that your particular slow debtor must be first properly classified before the right method of handling him can be judged. We will consider the first class as consisting of those who were abundantly able to pay at the time of contracting the indebtedness but have since met with reverses and through no fault of their own are unable to fulfil their obligations. The second class takes in those who are financially solvent but are given to the pursuit of interests that require ready cash and have gotten into a habit of putting off as long as possible the payment of all charge accounts. The third class consists of those whom we may call the "happy go lucky" variety, who contract obligations without at all consider-



ing their ability to meet them and who, of course, were not entitled to the credit extended them. The fourth class contains the deliberate "dead beats" who may or may not have means to pay, but who are "law proof," and do not intend to pay any account that can be avoided.

When a debtor of the first class—one who has met with reverses and is really temporarily unable to pay—

creditor is of a kindly, easy-going disposition he may simply bid Mr. Debtor take his time and pay when he gets ready. Both of these attitudes are wrong.

The correct method is to express a sincere regret for his misfortunes and by adroit questioning ascertain as closely as possible the exact situation and his probable future ability to take care of the account, and ac-

ably be a payment of \$10.00 or \$20.00, and a request for another six month's extension. In this case the better plan would be to ask for ten notes of \$20.00 each, payable monthly, commencing, say, sixty days from date with a proviso in each note that it should immediately become due in case of failure to pay any prior note. This offer shows a willingness to help the debtor on his feet by giving him all the time he needs and, therefore, creates good will and a disposition to exert every effort to meet the small amounts as they come due, where a demand for immediate payments that is impossible to comply with or an acceptance of a promise to pay as soon as able. Both tend to cause indifference to payment that is likely to mean the carrying of the account on the books for an indefinite time.

It is, of course, important that the debtor be notified of all instalments as they come due, and his interest in settling the account be kept up to the same pitch as when the instalment arrangement was made. Where the debtor owes a number of accounts at the time of meeting with misfortune it is clear that the creditor using helpful but energetic methods in handling the case will be the first one to receive his money, as well as to keep the debtor's good will which means future business and profit. This method should also be applied to debtors of the third class—those who contract obligations without assuring themselves of the means to pay them—with the difference that less time should be given them if there was a real reason for asking delay outside of bad management. Small weekly instead of monthly notes are often effective in this class of cases. But, of course, the underlying principle is that the promise to pay must accord with the ability to pay, as far as this may be determined.

The second and fourth classes of debtors—those who habitually delay payment, though solvent, and the "dead beats" who have no intention of paying at all—are the hardest to handle because in neither case do they make promises in good faith and, of course, their promises can not be relied upon. An experience of the writer while credit man for a manufacturer will serve to illustrate the usual real reason for slow payment by one well able to pay. A certain highly rated business man was way behind in his accounts and paid no attention to monthly statements



CLOISTER GATE AT TRINITY COLLEGE, CAMBRIDGE UNIVERSITY

tells his story of hard luck, it is easily possible for the creditor to take one of two positions, either one of which is wrong. On the one hand he may feel that he had nothing to do with bringing about his debtor's ill-luck, and that it is nothing to him,—that the debtor should sell what he has or borrow the money,—but that no matter how he has to get it his account must be paid, and at once. On the other hand, if the

cept his promises for the future only to the extent that they seem possible of fulfilment. For example, it would be exceedingly unwise to accept a six month's note for \$200.00 where the debtor will receive his income in small, occasional amounts and would be required to save up the amount to meet the note. This is too much to expect of average human nature, even with the best of intentions. The result might quite prob-



or the ordinary letters calling his attention to the matter. Therefore, regardless of his high rating, he was put upon the "high pressure" mailing list—cards sent every other day which finally induced an answer. His excuse was that he had been putting his ready money in some new buildings, hearses, etc., and could not conveniently take care of his account. In other words, he was using the manufacturer's money for his own business expansion! Diplomatic correspondence failing to change his views, he was given the alternative of paying in full at once or being sued. He paid and his account went to some other manufacturer, but the point the writer is making is that no business house can afford to carry this class of accounts on any terms, and that the only way to handle this class of debtors is either to promptly reform their habit of using their creditor's money regardless of terms, or to insist on settlement in full and let someone else have the doubtful benefit of their trade.

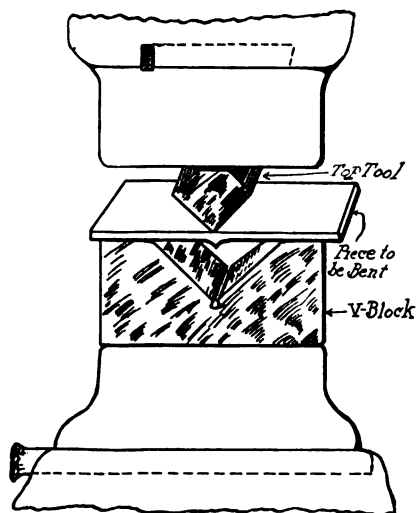
The "dead beats" are the hardest to handle of all as their promises are absolutely worthless and compelling payment by law is usually impossible. As a general rule the best results are obtained by refusing to accept promises to pay in the future for longer than a week or ten days and on each failure to keep a promise, again resorting to "high pressure" mail, in some form of notice every other day,—the very persistency of which may get on the debtor's nerves so that he will pay the account in order to avoid the constant annoyance. In the writer's experience this method got the money from a notorious "dead beat" who owed almost every one in the trade and who had paid no attention to this particular account for several years although all the usual methods had been tried from time to time,—but persistent "high pressure" mail brought a settlement in full in about three months,—and best of all, at a cost of not more than a couple of dollars.

An Improved V-Block for the Steam Hammer

BERT HILLYER.

A very useful tool in the shop where there is a steam hammer is the V-block. Some of the uses to which it is put are, bending angles, upsetting heavy bands or rings (not light ones), trueing up round stock and lots of other work. The usual

way of making these blocks is to shape a V that the square will fit into in the center of the block. While this design answers the purpose, they generally break in the sharp corner where they are weakest. Also a block of this kind soon fills up with scale in the corner making it necessary to clean it out after each operation. The block shown in engraving has no sharp corner. The



AN IMPROVED V-BLOCK FOR THE STEAM HAMMER

hole at the bottom of the V acts as a fillet. This also lets the scale drop down out of the way and in bending angles as in engraving, it leaves the full sharp corner on the outside. The V-block should be made the same size as the anvil die of the steam hammer so that it can be turned up-side-down to increase the height of the bottom die when bending long pieces with the sledge.

Thoughts on Timely Topics

By THORNTON.

Caustic Censure and Cheery Comment

YOU CAN'T SOLVE THE AUTO PROBLEM by warming the end of a cracker box and lamenting to the general store loafers on the eternal cussedness of progress and things in general. The smith who would rather figure on the possible chances of filling to a royal flush than on his chance of making a success of the auto repair game, had best stick to what he is doing. It isn't necessary for any smith to slap a mortgage on his shop in order to buy the few books he needs in order to go into the auto repair business. A little common sense, a good mechanical brain and ambition will carry a man farther on the road to success in the auto repair line than any other com-

bination. Ask the Editor for help if you are not quite sure of yourself. I know he has helped several auto repairsmiths.

IF THERE IS ANYTHING on this good old earth that makes a progressive blacksmith feel good it is to get together with his neighboring craft brother, agree verbally and honorably as gentlemen upon a little raise in prices, and to have his honorable neighbor cut to certain customers. This is the spirit that does so much to strengthen the loyalty, the honor and to uphold the standard of the good, old, craft—I don't think. Is it any wonder that so many smiths lose their religion in early life? Isn't it a wonder that there is any spirit of humanity left in a man who has been treated in this way? I often wonder what the really approved method of treatment for a competitor of this kind is. Would tarring and feathering and riding him on a Ford be too harsh?

THOSE VERSES IN FEBRUARY entitled "The Helpers" reminds me to write on the same subject. A good helper is a priceless asset to any shop. But priceless assets are about as scarce as modest chorus girls. You see a good helper must be a combination of good things. He should be honest, have a clean mind and mouth and then know at least something about blacksmithing. Of course, we might describe the ideal helper but then, what's the use. We might try to describe a ladies sewing circle at which gossip was taboo—but there ain't no such animal, as the farmer said when he saw the giraffe.

"WHAT'S THIS HERE OXY-ACETYLENE STUFF I hear so much about," writes a smith with tendencies toward Tom Tardy's ambition in life. For the edification of those few smiths who may be similarly situated and have failed to connect with what is going on in their line I want to say that "this oxy-acetylene stuff" is a combination of circumstances happening in the laws of nature that when lighted results in a flame that has the fires of hades backed off the thermostat as far as intensity is concerned. The flame of the oxy-acetylene torch is guaranteed to melt the heart of the frostiest plutocrat that ever pluted, and the armor plated stare of a granite faced butler is known to waver in the flame of the oxy-acetylene torch. Of course, that is going some, but the o.a flame is the real goods when it comes to heat. It cuts through steel like a sharp knife in cheese, and



welding is its most practical use. As a money maker the oxy-acetylene plant has the Philadelphia mint panting for air. In a locality where broken machinery parts are a regular habit and where auto parts are broken at least occasionally, an oxy-acetylene plant will pay for itself while you are starting it; it will lift the mortgage, build a new shop, equip it with new tools and still leave enough loose and unattached coin to make the first payment on a Ford with self-starter attached. Yes, the Oxy-acetylene flame is hot stuff, but, so is the smith who is fortunate enough to have an O-A plant.



The Age of the Racing Horse—The Importance of Blood in Breed

The average person interested in trotters and pacers if asked regarding the age at which such horses pass their usefulness for racing purposes would be inclined to place the limit at something less than ten years. As a matter of fact there are each season many good horses racing ranging in age from ten to sixteen years. Last year there were more than 160 trotters and pacers that took new records or reduced record previously made, faster than standard time. These performers, their record and sires, divided into age divisions are:

Sixteen Years Old

Velvet F., 2:22½, by Goodwood, Jr., 2:23½; Princess Lawndale, 2:30, by Prince Lawndale, 2:22½.

Fifteen Years Old

Miss Josephine, p., 2:15½, by Sir Alcantara, p., 2:05½.

Fourteen Years Old

Anna Dillard, p., 2:16½, by Hal Dillard, p., 2:04½.

Ennis Ward, 2:16½, by Reward J., p., 2:10½.

Carlos, 2:18½, by Monocacy, 2:15½.

Last Edition, 2:22½, by Gazette, p., 2:07½.

J. S. Patchen, 2:23½, by Jim Patchen.

Directum Queen, 2:24½, by Directum Kelly, 2:08½.

Thirteen Years Old

William Wallace, p., 2:09½, by Yancy, Q.

Lady Alice M., 2:12½, by Allerton, 2:09½.

Legal Heir, p., 2:13½, by Heir-at-Law, p., 2:05½.

Robert Lay, p., 2:15½, by Strongwood, p., 2:12½.

Charley King, 2:16½, by Charley Herr, 2:07.

Graft, 2:17½, by Grattan Boy, 2:08.

Teddy S, p., 2:18½, by Slivers S.

Zom Norte, 2:19½, by Zombro, 2:11.

Belle Marcos, p., 2:21, by Marcos Bozaris, 2:21.

Lady B, 2:21½, by Robin Hood.

Twelve Years Old

Peter Chimes, p., 2:07½, by Silent Chimes.

Vaster, 2:07½, by Vasten, p., 2:09½.

Gipse Margrave, p., 2:09½, by Margrave, 2:15½.

The Indian, p., 2:09½, by Hidalgo, p., 2:15.

Rustic Patenter, p., 2:11½, by Rustic Wood.

Bessie Gomah, p., 2:12½, by Prince Gomah, 2:26½.

Abbie Grattan, 2:12½, by Grattan, 2:13.

Gold Bug, p., 2:13½, by Red Holz.

Bradmont, p., 2:13½, by Alto Leyburn, 2:24½.

Hub Holiday, 2:14½, by Fair Promise, 2:20.

Elmoore, 2:14½, by Cecilian, 2:22.

Prodigal Mac, 2:15½, by Prodigal, 2:16.

Helen Whitman, p., 2:16½, by Duc Hal, p., 2:17½.

Senator King, 2:16½, by Bill Oats, 2:19½.

Derby Isle, p., 2:17½, by Island Wilkes, 2:13½.

Prince Seattle, 2:18½, by Stam B, 2:11½.

Wannetta, p., 2:18½, by Paclotus, 2:12½.

The King, p., 2:18½, by King Sultan, 2:23.

King Bingen, p., 2:19½, by Bingen, 2:06½.

McScuff, p., 2:20½, by Scuffler, 2:22.

Satuit, 2:21½, by Lo Franc, 2:26½.

Cromo, 2:22½, by Croghan, 2:29½.

Baron Silk, 2:23½, by Milrio.

Strong Bond, 2:25½, by The Bondsman.

Kocian, 2:25½, by Kremlin, 2:07½.

Eleven Years Old

Fred W., p., 2:07½, by Modern Chimes.

Linden Hall, 2:08, by Arion, 2:07½.

Governor Mason, 2:08½, by Colonel Mason.

Sam Be Sure, p., 2:08½, by Be Sure, p., 2:06½.

Fred B. Onward, p., 2:11½, by Basli-ford, p., 2:22½.

The Exile, 2:12, by The Bondsman.

Frankie Bogash, p., 2:12½, by Frank Bogash, p., 2:03½.

Cousin Ruth, p., 2:13½, by Country Cousin, 2:23½.

Crooked Colonel, p., 2:13½, by Col. Coit, p., 2:10½.

Amazer, p., 2:13½, by McKinney, 2:11½.

Sailor T., p., 2:13½, by Dennis T., p., 2:12½.

Rowdy Boy, p., 2:12½, by Charley Wilkes.

Leon, 2:13½, by Vita Nuova.

Guy Nixon, 2:14½, by Guy Princeton, p., 2:19½.

Hendricks Dillon, p., 2:14½, by Rex Americus, 2:11½.

Nelly Parker, p., 2:14½, by Hal Parker, p., 2:11½.

Rose Direct, p., 2:14½, by Direct Hal, p., 2:04½.

Dr. Weaver, p., 2:14½, by Alatus, p., 2:17½.

Anna C., 2:15½, by The Cascade, p., 2:14½.

Bitter Root Rose, 2:15½, by Evergeta.

Dan Wilkes, p., 2:15½, by Harrison Wilkes, 2:11½.

Brook Simmons, 2:15½, by Al Simmons.

Santolina, p., 2:15½, by McKinney, 2:11½.

Sadie Baron, 2:15½, by Baron Dillon, 2:12.

Kentucky Wiggins, 2:16½, by Wiggins, 2:19½.

Miss Albia, p., 2:16½, by Quick Shot, p., 2:13½.

Alice R., p., 2:17½, by Reward S., p., 2:15½.

Birdie Hal, p., 2:17½, by Hal B., p., 2:04½.

Bessie Axtello, 2:17½, by Axtello.

Madge Bradley, p., 2:17½, by Chehalis, p., 2:04½.

Prince Abbott, p., 2:18½, by Abbott Wilkes, p., 2:11.

John Emerson, 2:19½, by Reno's Baby, p., 2:14.

West Virginia Pointer, p., 2:19½, by Star Pointer, p., 1:59½.

Silver Sue, 2:19½, by Onward Silver, 2:05½.

Zola Wells, 2:19½, by Zola.

Areo, p., 2:20½, by Arion, 2:07½.

Don L., 2:20½, by Inline B., p., 2:14½.

Happy George, 2:20½, by Brazilian, 2:22½.

Marvel C., p., 2:20½, by Stirling S.

John Dewey, Jr., 2:23½, by Re Election, 2:27½.

Mayhew, 2:24½, by Ashland Wilkes, 2:17½.

Alden Chimes, 2:26½, by Chimes.

Kogo, 2:27, by Kyrillic, 2:14½.

Theodore Strongwood, 2:29½, Strongwood, p., 2:12½.

Red Mettle, 2:29½, by Allen L.

Ten Years Old

Waynetta, p., 2:04½, by The Admiral, p., 2:07½.

Dan Mac, p., 2:09½, by Legatier, p., 2:13½.

Pauline Hilda, p., 2:09½, by Anderson Wilkes, 2:22½.

M. F. D., p., 2:10½, by Col Coit, p., 2:10½.

Grace Hussey, 2:11½, by McKaig Simmons, p., 2:05½.

Maxine Audubon, p., 2:11½, by Audubon Boy, p., 1:59½.

Cheerful Charley, p., 2:11½, by Stirling S.

Buckeye Todd, 2:13, by Todd, 2:14½.

Aley Boy, p., 2:13½, by Aleyoro, 2:21½.

Ceskona, p., 2:13½, by Greystone.

Dartmouth, p., 2:13½, by Redland H.

Chester Mitchell, p., 2:13½, by Senator Mitchell, p., 2:19½.

Donnie B., 2:14½, by Nicol B., p., 2:08½.

Elsie S., p., 2:14½, by Sidney Prince, 2:20½.

Hackney Leaf, p., 2:14½, by Gold Leaf, 2:16½.

Notice B., 2:14, by All Monarch, 2:19½.

Tom H., p., 2:14½, by Tom Payne, 2:22½.

Direct Wilkes, p., 2:15½, by Lord Direct.

Jay Tell, 2:15½, by Actell, 2:18½.

Lord Ermine, p., 2:15½, by Greystone.

Lad McKinney, 2:15½, by McKinney, 2:11½.

Robert Bingen, 2:15½, by Bingen, 2:06½.

Fanny Berkshire, 2:16½, by Berkshire Chimes, 2:17½.

Helmetta, p., 2:16½, by Montana Helmet.



Judge Dickson, 2:16 $\frac{1}{4}$, by Anteros.
 Midnight Oro, 2:16 $\frac{1}{4}$, by Oro Wilkes,
 2:11.
 Phirobells, p., 2:16 $\frac{1}{4}$, by Ringing Bells,
 p., 2:13 $\frac{1}{2}$.
 Stella B., 2:16 $\frac{1}{4}$, by Imerino, 2:20.
 Prince W., p., 2:16 $\frac{1}{4}$, by Prince Alcyone,
 p., 2:19 $\frac{1}{4}$.
 Hazel M., p., 2:16 $\frac{1}{2}$, by Halrane, p.,
 2:10 $\frac{1}{4}$.
 Mack Harvey, p., 2:16 $\frac{1}{4}$, by Dr. Pat-
 ten.
 Augusta L., p., 2:17 $\frac{1}{4}$, by The Earl, p.,
 2:14 $\frac{1}{2}$.
 Deacon B., p., 2:17 $\frac{1}{4}$, by Fram, p.,
 2:17 $\frac{1}{4}$.
 Don C., p., 2:17 $\frac{1}{4}$, by Cylex, p., 2:21 $\frac{3}{4}$.
 Elizabeth M., 2:17 $\frac{1}{4}$, by Commissioner,
 2:17 $\frac{1}{4}$.
 Little Joe., p., 2:17 $\frac{1}{4}$, by Eben Holden,
 p., 2:17 $\frac{1}{4}$.
 May L. Dillon, 2:17 $\frac{1}{4}$, by Baron Dillon,
 2:12.
 Norway, 2:17 $\frac{1}{4}$, by Norway Chief, 2:23.
 Red Silk, 2:17 $\frac{1}{4}$, by Silkwood, p., 2:07.
 Star Athlete, 2:17 $\frac{1}{4}$, by Athletic Star.
 Cute, 2:17 $\frac{1}{2}$, by Wesley.
 Alex McGregor, 2:18 $\frac{1}{4}$, by Cresceno,
 2:02 $\frac{1}{4}$.
 Flaming Arrow, p., 2:18 $\frac{1}{4}$, by George
 Simmons, 2:28.
 King Alton, p., 2:18 $\frac{1}{4}$, by Chamois, p.,
 2:12 $\frac{1}{4}$.
 King Bogash, p., 2:18 $\frac{1}{4}$, by Frank
 Bogash, p., 2:03 $\frac{3}{4}$.
 Libbie Medium, 2:18 $\frac{1}{4}$, by Riley
 Medium, p., 2:10 $\frac{1}{4}$.
 Penn Nelson, 2:18 $\frac{1}{4}$, by William Penn
 First, 2:07 $\frac{1}{4}$.
 Stults Chimes, 2:18 $\frac{1}{4}$, by Council
 Chimes, p., 2:07 $\frac{1}{2}$.
 Celia M., 2:18 $\frac{1}{2}$, by Rex Leon, p.,
 2:17 $\frac{1}{4}$.
 Baron Wilkes, 2:19 $\frac{1}{4}$, by Prince Eugene.
 Bon Jay, p., 2:19 $\frac{1}{4}$, by Jay McGregor,
 2:07 $\frac{1}{4}$.
 Baron Linhurst, 2:19 $\frac{1}{4}$, by Baron
 Wilkes, Jr., 2:18 $\frac{1}{4}$.
 Fanny Willis, 2:19 $\frac{1}{4}$, by Imperatus,
 2:29 $\frac{1}{4}$.
 Jack Barry, p., 2:19 $\frac{1}{4}$, by Fair Promise,
 2:20.
 Junius Girl, p., 2:19 $\frac{1}{4}$, by Mambrino K.
 Carl C., 2:19 $\frac{1}{2}$, by G. W. D., p., 2:08 $\frac{1}{4}$.
 Drift Rex, 2:19 $\frac{1}{4}$, by Drift Allerton,
 2:23 $\frac{1}{2}$.
 Little Jim, p., 2:20 $\frac{1}{4}$, by Don Lorenzo,
 p., 2:17 $\frac{1}{4}$.
 Guy Direct, 2:20 $\frac{1}{4}$, by Rey Direct, p.,
 2:10.
 Emery, 2:20 $\frac{1}{2}$, by Renben S., 2:10 $\frac{1}{4}$.
 Sir Mortmier, 2:20 $\frac{1}{2}$, by McAdams,
 Will Bloom, 2:20 $\frac{1}{2}$, by McAdams,
 2:18 $\frac{1}{4}$.
 Montpelier, p., 2:21 $\frac{1}{4}$, by Slivers S.
 George Crescens, 2:22, by Crescens,
 2:02 $\frac{1}{4}$.
 Devil Hal, p., 2:22 $\frac{1}{4}$, by Direct Hal, p.,
 2:04 $\frac{1}{4}$.
 Susie Oro, p., 2:22 $\frac{1}{4}$, by Oro Wilkes,
 2:11.
 Alseer, 2:22 $\frac{1}{2}$, by Allerton, 2:09 $\frac{1}{4}$.
 Katana, 2:23 $\frac{1}{4}$, by Kavalli, p., 2:07 $\frac{1}{4}$.
 Selah Grattan, 2:23 $\frac{1}{4}$, by Grattan, Boy,
 2:08.
 Phillis D., p., 2:23 $\frac{1}{4}$, by Phillipi.
 Benares, 2:24, by Bingara.
 Shadeland Clayton, 2:24, by Shadeland
 Thunderbolt.
 Judge Kelly, 2:24 $\frac{1}{4}$, by Lord Cecil.
 Robert L., 2:24 $\frac{1}{4}$, by Shea Alcone.
 Zola Belle, 2:25 $\frac{1}{4}$, by Axworthy,
 2:15 $\frac{1}{2}$.
 A rather remarkable feature of this

list of aged trotters and pacers is that
 ten of them took records below 2:10,
 forty-six others took records below 2:15
 and sixty-three others took records below
 2:20. The showing these trotters and
 pacers of advanced age made last season
 strongly supports the contention of the
 admirers of trotting bred horses that this
 strictly American product surpasses all
 other breeds of horses in point of the
 stamina that makes for the withstanding
 of the wear and tear demanded of cavalry
 horses for long periods. Since the break-
 ing out of the war, now raging in Europe,
 there has been a great deal of discussion
 regarding the merits, for cavalry purposes,



**MR. W. J. PETTIGREW OF NORTH
 CAROLINA AND HIS HAND-
 FORGED TOOLS. THESE ARE
 FROM THE SOLID BAR AND
 HAVE TAKEN TWO PRE-
 MIUMS**

of the different breeds of horses and in
 view of the fact that most authorities
 agree that speed demand of the cavalry
 horse is speed at the trot, not at the
 furious running gait, and that stamina
 is the most important quality, it would
 seem as though the claims for the trotting
 bred horse are strongly supported by
 facts.

Among those interested in breeding
 trotters the subject of brood mare sires is
 always an important one. In the earlier
 period of trotting horse breeding the chief
 concern of the breeder was in the selec-
 tion of a stallion to mate his mares with.
 For a long time little attention was paid
 to the selection of brood mares from a
 family viewpoint. Then the success of
 American Star mares when mated with
 Hambletonian sires drew attention to the
 affinity of certain strains of blood in the
 female line for other strains in male line.
 Then came the still more noticeable suc-
 cess of Mambrino Patchen mares when
 mated with sires of Wilkes blood. From
 that time the trotting families have been
 divided into those prolific through the
 male line. Breeders endeavor to secure
 mares for their studs from a line prolif-
 ic in the production of speed through its fe-
 males. It is a rather note-worthy fact
 that the three living sires whose daughters
 have been most prolific in the production
 of 2:10 trotting speed, represent three
 different sons of Hambletonian. One of
 these sires Arion, 2:07 $\frac{1}{4}$, is the son of
 Electioner that placed the world's trotting
 record for two-year-olds at 2:10 $\frac{1}{4}$, where
 it remained for years. Another is Krem-
 lin, 2:07 $\frac{1}{4}$, once holder of the world's

record for trotting stallions, a son of Lord
 Russell, the brother to the one-time cham-
 pion trotter Maud S., 2:08 $\frac{1}{4}$, he by
 Harold. The third is Moko, son of Baron
 Wilkes, 2:18, one of George Wilkes' most
 noted sons. Neither Arion nor Kremlin
 have established much of a family in the
 male line, but the daughters of each are
 producing extreme speed with remarkable
 infirmity. Moko is a much younger horse
 than the other two and it is yet too early
 to say with certainty that his blood will
 not breed on through his sons; he has
 two or three sons that are among the good
 sires of their age, but it seem fairly sure
 that his greatest fame will come through
 his daughters. These three stallions, the
 greatest living sires of extreme speed pro-
 ducing daughters, together with th 2:10
 trotters produced by the daughters of
 each are as follows:

ARION, 2:07 $\frac{1}{4}$, foaled, 1889, by
 Electioneer, dam Manette, by
 Nutwood 2:18 $\frac{1}{4}$
 Etarra (dam Alicia Arion), by
 Al Stanley, 2:08 $\frac{1}{4}$ 2:03
 Margaret Parrish, 4, (dam Lady
 Leyburn, 2:23 $\frac{1}{4}$), by Vice Com-
 modore, 2:11 2:06 $\frac{1}{4}$
 Sadie Mac (dam Fanella, 2:13),
 by Peter The Great, 2:07 $\frac{1}{4}$ 2:07 $\frac{1}{4}$
 McGindie (dam Ethel Vanyhn) by
 Peter the Great, 2:07 $\frac{1}{4}$ 2:07 $\frac{1}{4}$
 Lula Arion, 4, (dam Lady Arion,
 2:19), by Peter The Great,
 2:07 $\frac{1}{4}$ 2:08 $\frac{1}{4}$
 Albia (dam Narion), by Bingen,
 2:06 $\frac{1}{4}$ 2:08 $\frac{1}{4}$
 Magowan, 3, (dam Fanella,
 2:13), by Vice Commodore,
 2:11 2:08 $\frac{1}{4}$

KREMLIN, 2:07 $\frac{1}{4}$, foaled, 1887, by
 Lord Russell, dam Eventida, by
 Woodford Mambrino, 2:21 $\frac{1}{2}$
 Baden (dam Kaldah), by Bingara, 2:05 $\frac{1}{4}$
 Bergen (dam Russula), by Bin-
 gara 2:06 $\frac{1}{4}$
 Binvol, (Adam Komra), by Bin-
 gara 2:07 $\frac{1}{4}$
 Aquim (dam Ka, 2:23 $\frac{1}{4}$) by
 Aquilin, 2:19 $\frac{1}{4}$ 2:08
 Aquil (dam Ka, 2:23 $\frac{1}{4}$), by
 Aquilin, 2:19 $\frac{1}{4}$ 2:08 $\frac{1}{4}$
 Brione (da mKarna) by Bingara, 2:08 $\frac{1}{4}$
 Bismya (dam Keshena), by Bin-
 gara 2:09 $\frac{1}{4}$

MOKO, foaled, 1895, by Baron
 Wilkes, 2:18, dam Queen Ethel,
 by Strathmore.
 The Harvester (dam Notelet),
 by Walnut Hall, 2:08 $\frac{1}{4}$ 2:01
 O'Neill (dam Ozalma), by Walnut
 Hall, 2:08 $\frac{1}{4}$ 2:07 $\frac{1}{4}$
 Martha Tipton (dam Sister Min),
 by Walnut Hall, 2:08 $\frac{1}{4}$ 2:09 $\frac{1}{4}$
 Vito, 4, (dam Mary North), by
 Prodgal, 2:16 2:09 $\frac{1}{2}$
 Northpur, 3, (dam Mary North),
 by San Francisco, 2:07 $\frac{1}{4}$ 2:09 $\frac{1}{4}$
 Little Hall (dam Driflert, 2:22),
 by Walnut Hall, 2:08 $\frac{1}{4}$ 2:10
 Moko Hall (dam Daisy Wilkes),
 by Walnut Hall, 2:08 $\frac{1}{4}$ 2:10

It is rather a remarkable fact that the
 average speed of the 2:10 trotters produc-
 ed by the daughters of each of these sires
 is only a small fraction of a second apart
 in each instance. The average of the seven
 produced by Arion's daughters is 2:07 $\frac{1}{4}$;
 that of the seven produced by Kremlin's
 daughters, 2:07 $\frac{5}{7}$ and that of the seven
 produced by Moko's daughters, 2:08 $\frac{3}{28}$.



Why the Smith Smiles

W. O. B.

The Blacksmith has a soft, soft snap; when he begins his day, he simply takes his "Big Ben's" hint an' tumbles from the hay. Of course, this hap's at 3 A. M.—but then you surely know, there's weeds to shovel, grass to weed or snow to hoe or mow. At four the shop is open and he sets things all a'right, for like as not it's snowed (or rained)—an' shop roofs ain't jes, tight. At five he starts the fires in the forges for the day—this keeps him busy pilin' fuel an' blowin' smoke away.

At six he'll start the shoein' o' the horses that are in, for he knows well that Work an Hustle surely fetch the tin. At seven, by the whistle, he knows that more will come, an' if he don't keep hustlin' then his business will go bum. At eight he'll have a let-up of fifteen minutes time to grab some eats, an' stow some suds, t' clear his throat o' grime. At nine will come a farmer with a busted auto horn, who offers for t' pay him with some mouldy, musty corn.

At ten the village butcher will bring along his rig, an' tell the smith: "Just charge it, 'till y'r meat bill's jus' as big." At eleven he will git a job at fixin' up some junk, for some ol' crusty citizen with swags o' dough an' bunk. He'll tell the smith t' call an' git some carrots for his pay—an' then folks wonder why some smiths are prematurely gray. At twelve he'll think o' dinner but, of course, he cannot eat for sure as death an' taxes there are shoeless horses' feet.

At one he'll go to dinner, an' at two he'll get his slate, an' chalk up all the jobs he did for a week or two or eight. At three an auto limps up with a busted spring or two. The owner wants "a right good job" an' in a hurry, too. At four he'll have it finished an' put upon the car—his pay will be in matches, two spent batteries, a cigar. At four-fifteen our hero will shoe a peddler's nag—an ugly brute with shifty eyes an' droopy ears that sag. He'll pull an' tug, an' swear an' cuss; he'll fret an' fume an' sweat, an' two years hence he'll tell you: "Nope, I ain't been paid as yet."

At five he'll think o' quittin' but he never gits away. For in will stroll a native who's a healthy gossipin' jay. At six his little daughter will call him home to sup; but of course: "I cannot come, tell Ma, 'till all this rush let's up." At eight he saunters home to git his apple pie an' milk. He tells his wife, "If biz keeps up y'kin have that dress o' silk." Back to the shop he hikes at nine to lock up for the night, to pick things up, an' straighten out the things that ain't jus' right.

At nine-eighteen with things in shape an' he has locked the shop, the township's chronic borrower will want a wrench or mop. The smith accommodates him for he cannot turn him down—he calmly opens shop again with narry cuss nor frown. His working day will finish at a quarter after ten, which gives him time to study 'till the morning comes again. Now, ain't there every reason for the smiling smithy's face, for if work makes one happy, then the smile has found it's place.



Heats, Sparks, Welds

Spring cleaning—is it too early to talk about this? Here's a suggestion: Treat the inside walls of the shop to a coat of white-wash after you have administered the usual spring cleaning treatment to your shop.

You can no more tell how far a gun will carry by the noise it makes than you can tell how good the new helper is by the way he talks.

The future that is coming to you cannot be side-tracked by visiting the fortune-teller.

On the scale of profit and loss, small capital rightly used may far outweigh big capital handled unwisely.

Just remember when you consider this a pretty rough old world that you cannot smooth a stick with the soft side of the said paper.

The true salesman is not judged so much by his ability to sell goods on the buyers terms, but on his ability to sell goods under difficulties.

When you adjust a mistake, do it so that the customer will think you fair and square after all. Adjust the trouble on the right basis and he will think you the right sort of man to do business with.

When an interfering animal seems to present a particularly puzzling problem, suggest to the owner that he try curing by fattening. The fuller the animal gets in the quarter, the less likely he is to hit himself.

Success will stare you in the face if you pay careful attention to each old customer's wants and then pay just as much attention to the want of the new ones.

If you are in business for profit, shorten up on expenses and losses and when costs advance, do not hesitate to pad the selling price accordingly. Fattened profits will be the result.

It works both ways: When you promise a job for a certain day, see that it is done that day, and when a customer promises to pay on a certain day, insist upon getting your money upon that certain day. You can set a good example for your customers in this way.

Don't forget the Shop Number that is now in preparation. Let us have something from you for this issue. How you did a certain difficult job, how you built a certain labor-saving machine or how you have arranged your shop equipment, are all items that we are looking for. Let us have something from you along these lines.

Do you consider your telephone an opportunity or an expense? Try it as a

bill collector and a business getter. Make your telephone investment pay dividends. It is a real opportunity. Why not make the most of it? How have these first months of 1916 treated you? How do they compare with last year? Will you need to push harder for prosperity or are you ahead now? Get both shoulders to the wheel and help to make 1916 the biggest year that you have yet seen.

And while you are doing your spring cleaning, do not forget that collection of old tires, wheels and other junk that is littering up the outside of the shop. It doesn't add to your profit, it doesn't add to the appearance of your place of business, it doesn't increase the value of your property and it doesn't improve the appearance of the neighborhood. Why not clean it up and clear it out? Save out what is really worth anything, but do throw out the truck and trash.

Did you ever consider welding as just about the most exacting operation in the whole list of blacksmith shop stunts. There are no half measures when welding is under consideration. Either a weld is a good job or it isn't a good job, and when a welding job isn't good, it is absolutely worthless. There are no arguments, no amount of demonstration, no amount of testing will make it anything but what it really is.

There are still a few smiths, though we are glad to say they are becoming fewer every year, who seem to think that patent medicine signs and tobacco advertisements add to the appearance of their shop. If it is worth the patent medicine maker's and the tobacco maker's while to put signs upon your shop, how much more valuable would a few neat signs of your own be to you. Try a few signs advertising your own business and see if they will not put more real money into your own pocket than all the advertising that a patent medicine maker can slap upon a whole country-side.

You can no more run your business on the money in your debtor's pockets than you can build a house on the foundation supporting the residence of your neighbor. What does it profit you or your family if you work 20 hours out of every 24 and fail to get the money to which you are rightly entitled. Clean up the old accounts—get after them tactfully, persistently and thoroughly. Sue for your money if necessary and then start with a clean slate and endeavor to keep it just as clean as possible.

FOR THE MAN WHO CANNOT GET ALONG WITHOUT DRINK

Here is a suggestion for the man who is bound to a saloon and drink: Start a saloon in your own home. Be the only customer—you'll not have any license to pay. Give your wife, or mother (if you haven't a wife) two dollars to buy a gallon of whiskey, and remember there are 69 drinks in a gallon. Buy your drinks from no one but your wife or mother. By the time the first gallon is gone she will have eight dollars to put into the bank and two dollars to start business again. If you live ten years and continue to buy your booze from her and then die with snakes in your boots, she will have money enough to give you a decent burial, educate the children, buy a house and lot and marry a decent man and quit thinking about you entirely.—Exchange.



Our Honor Roll

FORTY-NINE NEW NAMES

Just 49 new names have been placed on this month's Honor Roll. Forty-nine new subscribers have paid up to or beyond December, 1915. And of these 49 new Honor Roll readers 19 have paid their subscriptions up to or beyond 1930—19 have each made a saving of two or more dollars on their subscriptions. If the saving per subscriber averages two dollars for the entire 49 it means that Our Long-Time Rates have saved "Our Folks" just ninety-eight dollars this past month. Why don't you get some of that saving? Why not look over the long-time rates and pick out a saving rate that will fit your future? Think it over, Mr. Reader—insure your subscription at the lowest possible rate.

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W. C. Watt, Kansas.....	Dec., 1915	F. Koppins, Ala.....	Nov., 1915
L. J. Stites, N. J.....	Jan., 1916	Y. C. Llenert, S. Australia.....	Oct., 1915
Waddington Farm, W. Va.....	Mar., 1916	W. B. Abell, N. Y.....	Oct., 1915
A. A. MacLean, Nev.....	Feb., 1916	W. R. Turner, Man.....	Oct., 1915
John H. W. Schneider, Cal.....	Dec., 1915	C. Nelson, Neb.....	Sept., 1915
J. Taylor, Calif.....	Oct., 1915	H. M. Andersen, Calif.....	Aug., 1915
O. Temple, Idaho.....	Jan., 1916	Camp Bros., Texas.....	Aug., 1915
N. Karolewicz, S. Dak.....	Jan., 1916	L. C. Larsen, Iowa.....	July, 1915
E. L. Lalin, N. Y.....	Dec., 1915	S. Effenaar, S. Africa.....	July, 1915
J. A. Hulvey, Ill.....	Dec., 1915	G. L. DeWitt, Mont.....	July, 1915
A. W. Speir, Ohio.....	Nov., 1915	W. W. Gregg, Texas.....	July, 1915
W. R. Clepper, Texas.....	Nov., 1915	W. R. Stroupe, N. C.....	July, 1915
G. H. Isley, Mass.....	Nov., 1915	O. C. Young, Mich.....	June, 1915
Reynolds Bros., Penna.....	Sept., 1915	Otto Sippel, Penna.....	June, 1915
F. W. Krenz, Calif.....	Aug., 1915	A. Chapman, N. Y.....	June, 1915
C. E. Allen, Neb.....	Aug., 1915	C. Birely, Md.....	June, 1915
A. E. Spangberg, Oregon.....	May, 1915	F. H. Shupe, Penna.....	June, 1915
D. M. Kille, Okla.....	Apr., 1915	J. C. Stover, Penna.....	Apr., 1915
G. Gullgren, Iowa.....	Apr., 1915	W. Schoonover, Penna.....	Apr., 1915
G. Fricke, Minn.....	Mar., 1915	J. M. Rumrle, Iowa.....	May, 1915
V. Priessnitz, Wisc.....	Mar., 1915	Lownsdale Bros., Mo.....	Mar., 1915
E. Price, Ill.....	Feb., 1915	J. Carswell, Ark.....	Mar., 1915
D. C. Garber, Ohio.....	Feb., 1915	G. E. Glasier, Ohio.....	Mar., 1915
J. H. Kirk, Ill.....	Feb., 1915	G. Fath & Co., S. Africa.....	Mar., 1915
E. B. Hiteshue, Ohio.....	Feb., 1915	T. Bradley, N. S. Wales.....	Mar., 1915
H. F. Schreiber, Penna.....	Feb., 1915	L. T. Needham, Ill.....	Feb., 1915
C. M. Adams, Conn.....	Jan., 1915	G. C. Disinger, Missa.....	Feb., 1915
J. S. Damm, Iowa.....	Jan., 1915	J. Hughes, Ohio.....	Feb., 1915
J. M. Withers, Hawaii.....	Jan., 1915	J. Wieber, Minn.....	Jan., 1915
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Geo. Tatum, Jr., Fla.....	Dec., 1914	W. G. Wise, Calif.....	Jan., 1915
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A. N. Estes, Va.....	Dec., 1914	J. Curran, Ariz.....	Jan., 1915
J. Badley, Man.....	Dec., 1914	S. P. Harney, Mont.....	Dec., 1914
E. G. Naylor, Md.....	Dec., 1914	W. Breckner, Okla.....	Dec., 1914
Halvorson Brothers, S. D.....	Nov., 1914	J. Pabina, Neb.....	Dec., 1914
P. Schlick, Wash.....	Nov., 1914	P. Frederickson, Iowa.....	Nov., 1914
H. E. Snyder, Ore.....	Nov., 1914	L. O. Leturs, Ill.....	Nov., 1914
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C. Richenoecker, N. Y.....	Oct., 1914	W. O. Grant, Cal.....	Oct., 1914
W. L. Berthoff, N. J.....	Oct., 1914	W. H. Miller, Iowa.....	Oct., 1914
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Ed. Larson, N. D.....	Sept., 1914	O. A. Mortimer, Idaho.....	Sept., 1914
R. T. Monk, Ill.....	Sept., 1914	H. J. Hyatt, Wash.....	Sept., 1914
W. T. De Young, Ill.....	Sept., 1914	J. N. Skow, Iowa.....	Sept., 1914
Charles Wells, Colo.....	Aug., 1914	A. D. Standford, Wash.....	Sept., 1914
H. G. Weaver, Penna.....	Aug., 1914	T. Temkiewicz, Que.....	Sept., 1914
Working Men's College, Vict.....	June, 1914	A. Peliffer, Ohio.....	Aug., 1914
F. M. Kenoyer, Neb.....	June, 1914	W. D. Valentine, Iowa.....	Aug., 1914
R. C. Frederick, N. D.....	May, 1914	G. Hoffman, N. Y.....	July, 1914
H. L. Fenton, N. Mexico.....	May, 1914	J. Erman, Ark.....	July, 1914
J. Carl, Iowa.....	May, 1914	W. K. W. Hansen, Penn.....	June, 1914
J. E. Little, Penna.....	May, 1914	Robert Tochter, Cal.....	June, 1914
H. I. Brenzel, N. Y.....	Apr., 1914	F. Van Marter, N. Y.....	June, 1914
W. E. Parr, Iowa.....	Apr., 1914	F. Norrie, Yukon Ty.....	Jan., 1914
F. Bramek, Neb.....	Apr., 1914	E. Anders & Son, S. Australia.....	May, 1914
L. A. Hulien, Calif.....	Apr., 1914	Louisa Carriage Wks., Va.....	May, 1914
J. E. Ray, Minn.....	Mar., 1914	S. Smith, Tex.....	Apr., 1914
A. Hulstrand, N. D.....	Mar., 1914	J. W. Haar, La.....	Mar., 1914
W. F. Rieke, Wis.....	Mar., 1914	D. W. Smith, La.....	Mar., 1914
E. F. Selbert, Calif.....	Mar., 1914	D. W. Smith, R. I.....	Mar., 1914
H. Roeschewetter, Mo.....	Mar., 1914	E. A. Dillon, Nev.....	Mar., 1914
W. B. Briant, N. J.....	Mar., 1914	D. F. Kuster, Wash.....	Mar., 1914
A. Bosch, N. Y.....	Mar., 1914	G. F. Johnson, Mich.....	Feb., 1914
A. R. Johnson, R. I.....	Feb., 1914	R. H. Keith, Iowa.....	Jan., 1914
F. Jacobs, Ohio.....	Feb., 1914	J. B. Scheidler, Ind.....	Dec., 1913
A. J. Ferry, Ill.....	Jan., 1914	J. H. Ickes, Penn.....	Dec., 1913
B. G. Walker, Calif.....	Jan., 1914	E. Willis, Colo.....	Dec., 1913
H. D. Erskine, Vt.....	Jan., 1914	O. M. Johnson, Minn.....	Oct., 1913
H. Fowler, Penna.....	Jan., 1914	H. Feldus, N. be.....	Sept., 1913
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M. Lamoreaux, Ohio.....	Dec., 1913	W. F. Kline, Kansas.....	May, 1913
C. R. Davis, N. Y.....	Dec., 1913	E. Mossner, Queens, Australia.....	Apr., 1913
F. W. Copeland, Kansas.....	Dec., 1913	E. Slee, N. Y.....	Feb., 1913
J. L. Tomlin, Kansas.....	Dec., 1913	J. L. Jester, Mo.....	Jan., 1913
M. A. Davis, N. Y.....	Dec., 1913	G. A. Moffatt, Yukon Ty.....	Jan., 1913
M. H. Troyte, Ill.....	Dec., 1913	O. A. Huff, Penn.....	Dec., 1913
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E. G. Mulholland, Me.....	June, 1910
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C. L. Crossen, Ill.....	Feb., 1910
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W. Harsenape, S. Africa.....	Jan., 1910
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A. O. Gloux, Mass.....	Dec., 1910
A. A. Murray, Texas.....	Dec., 1910



The Horseshoer

Shoeing the Horse that Strikes

DR. JACK SEITER.

The Question.

"I am shoeing a horse that forges or strikes his front shoes with his hind feet, (The horse is driven to a light grocery wagon) and I cannot make him stop. I have set his hind shoes $\frac{3}{4}$ of an inch in front of the foot and I let the shoe project forward on the front foot, but get no results. This, of course, stops the noise but when the shoe is again set properly he strikes again."

The Answer

In answer to the above inquiry I will state that it is impossible, and consequently impracticable, to even attempt to offer any rational advice in regards to shoeing an animal to rectify the fault of gait mentioned, without more explicit information regarding the gait, conformation, age, disposition and condition of the animal in question.

We would not attempt to shoe the animal with the straight upright pastern and foot in the same manner as the one with the sloping pastern and long toed or low heeled foot.

In order to intelligently diagnose and offer advice in a case like this it is necessary for one to have more information along the above lines.

Forging is caused directly, or indirectly, by numerous causes, foremost among which are conformation, shoeing, manner of driving, manner of hitching, especially of the head and oftentimes the breeching or backstraps are either to loose or too tight. To much work at a gait that the animal is not accustomed to, or is not built or bred for, causes leg weariness, especially so in the very young animals after a long or hard drive over bad roads. On the other hand we often find that insufficient work or exercise, may also be the

cause of an animal forging, owing to the fact that when they are hitched up they are feeling good and want to start off as fast as they can. They then naturally take hold of the bit and try to out do themselves. The driver has consequently to pull them up to restrain them and pulling an animal together naturally has a tendency to make him forge.

Some of the methods used to minimize this fault of gait, are as follows:

First: See that the animal is in good condition and properly nourished so that the work that it is required to do will not be a continuous drudge and tire an animal to the extent of exhaustion or leg weariness.

Second: See that it is properly hitched, and that the harness fits well; then before trying to experiment with the shoeing I would advise the driver to find out just at what gait, or rate of speed, the animal is most inclined to forge, and then either try to drive him a trifle slower, or a trifle faster than this gait. At times we can correct an animal by simply taking hold of the reins and at the same time give him a sharp tap with the whip, this will teach him that he is being punished for doing something that he had ought not to do. By taking a little time and patience in this manner we may correct the evil without the use of any radical methods along the lines of shoeing.

At times either simply checking up the head several holes higher, or probably lowering the head by the use of martingales or a standing halter will have the desired results. These are all little points that the experienced horseman will readily understand as having a very essential bearing on the cause, and elimination of the trouble.

In the young animal the direct cause of forging is, in the majority of cases, traced directly to the fact that the shoes are far too heavy. The colt is generally shod with the same weight of shoe as the older and more seasoned animal, and far too often he is required to do the same amount of work. Naturally he becomes tired and the heavy cumbersome shoes probably seem as though they weighed a ton, before the day is over. In shoeing the young animal the first few times, it is advisable to shoe as light as practicable, as he will become leg weary enough without carrying a lot of excess iron on his feet. If shod light at first and then given plenty of time to become har-

dened and muscled up sufficiently to do the work required of him, we can then gradually add more weight in order to make the shoe practical for the work required.

Now by this time the colt will have become used to his work and his gait established. If he still forges there is still plenty of time to experiment along the lines of shoeing. Generally we can overcome the fault by simply shortening the toes of the front feet and shoeing with a rolled toe shoe, or a square toed shoe, or if in the winter time and calks are used, set the toe calk well back toward the inner web of the shoe and have it as low as possible to answer the purpose and be practicable. This will quicken the stride or action by letting the animal break over the toe with the least possible resistance. If no results are derived by this method it is advisable to add more weight, probably a toe weight or possibly a heel weighted shoe will be indicated. If the animal is used on the hard paved streets of the city, a rubber pad may answer the purpose far better, as it has a tendency to raise the heel and used with a light tip it is bound to quicken the front action.

If you have given the above remedies a fair trial and still have had no results, it will be time to make some changes behind, and I believe it is the best policy to fit the shoe right full to the toe, and shoe as light as possible. Also have the shoe plenty long enough so that both heels extend out beyond the foot fully an inch or more. The long heel will naturally strike the ground sooner than if they were only as short as the foot. The shoe being fitted right out flush to the toe, will have a tendency to detain the foot longer on the ground before it breaks over than it would if the shoe was set back from the toe, generally this method of slowing up the hind action and quickening that in front, will stop the worst of them.

Notice should be taking of the point of contact, where the hind toe strikes the front shoe. At times when the front shoe is struck along the outer branch of the bearing surface, we can remedy the trouble by simply lowering the front feet a trifle along the outside, and the hind feet along the inside and then have the toe calk set well toward the outside and shoe short and close at the inside heel. Have a good long outer heel with the calk well, "muled" out. This will naturally widen out the gait behind and close that of the front limbs up, and probably allow the animal to



clear himself.

As a rule the animal with the short upright pastern, and foot should be shod short and close, and if calks are used, they should be side calks. The animal with the oblique or sloping conformation should be shod with a fair length of shoe, especially should this be the case behind they may also be shod lighter because they naturally have more action and a greater scope of flexibility than the animal with the upright or straight foot and ankle.

Setting the hind shoe back and letting the toe of the foot project out over the shoe never in the world stopped an animal from forging. The fact that the toe of the hind foot came in contact with the shoe on the front foot and so deadened the sound, lead some to believe that they had derived the desired results, and rectified the trouble, but such is not the case. You simply do not hear the "clicking" sound any more, but the animal forges just the same.

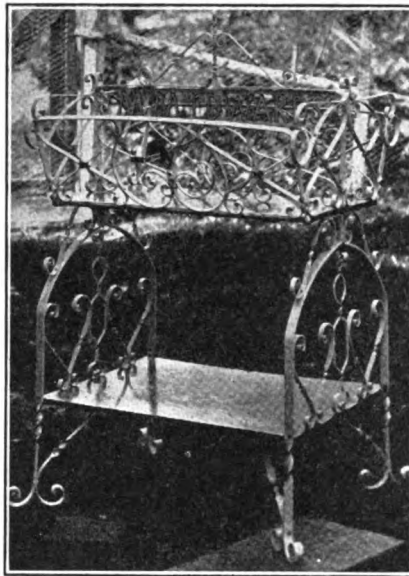
There are some radical methods employed to overcome the trouble, such as shoeing with a reversed shoe. When an animal strikes the toe of the front shoe, this reversed shoe is often used, and as its name implies it is simply a front shoe nailed to the foot with the heels toward the toe. The toe of the shoe lays across the heels and frog in the same manner as does a bar shoe. This adds weight to the heels and so gives more action to the flexor muscles. There being nothing at the toe to hinder an easy break-over, and often times an animal will go clear shod this way. If he does hit, no sound will be heard, because the hind shoe only strikes the horn and not the shoe, of the front foot, and as in the case with the extended hind toe; no sound, no forging.

Heavy heel weighted shoes behind increase the flexion and naturally decrease the extension. Toe weighted shoes in front increase the extension and diminish the flexion, so this used to be quite a combination used on the old-time coach horses.

Lowering the front feet at the heels and leaving the toe, and then cutting off the hind toes and leaving the heels high, was another coach horse combination. The long toes and low heels in front had a tendency to make an animal point, as it were toward the front; and the short hind toes and high heels made the hind limbs carry back, and so spread the animals hind and fore feet apart, this was further accomplished by raising the animals head

up as high as possible and shortening the back strap and crupper, thus drawing the head and tail together and naturally widening the space between the hind and fore feet. But this treatment would not do for any length of time as the strain on the back, and on the tendons was too severe, and invariably lameness and soreness were the common sequels.

This method, and that of the shoe set back from the hind toe, the reversed front shoe, are all methods employed by the horse dealer to get quick results to enable him to sell an



MR. EDWARDS' ARTISTIC MUSIC STAND

animal, and the rubber pad has been the medium under which many a confirmed forger was gotten rid of, without the buyer ever realizing the fact until he tried to shoe the animal with plain shoes.

Naturally some animals are of such conformation that it is next to impossible to stop them from forging. Take, for instance, one of those short-bodied, long-legged, coarse bred, four or five year olds, that has never been broken or shod, consequently has no muscular development to speak of, and in fact was "born tired"; has no vim, vigor or vitality. To begin with, shoe one of this kind and try to stop him from forging and you will find that you have undertaken quite a contract. There is hardly any use in experimenting with one of this kind, as they will not respond to a change any more than they do to a lash of the whip. Whip one of this kind and he will make a jump or two and then settle down to that old "sloppy" gait again. Shoeing has

no effect on them, and the only thing to do is to dress the feet down well and shoe as light as practicable.

I was called to one of our largest forts recently, to look over a lot of young animals that had been bought for army purposes, and I noticed one of them actually forged at every step, even when walking. He had considerable foot and probably had not been shod for several months. Being well acquainted with the boys that had charge of the shoeing forge, I asked them what they done in a case like the one mentioned, and they said: "You know Doc we are not allowed to use any fantastic shoes, in fact everything we do is under certain restriction. We must shoe plain, and not use a knife to excess on the feet, not touch the frog or open up the heels nor cut out the sole. In fact we shoe as near to nature as possible at all times. Of course, all the horses that are bought for army purposes are thoroughly inspected, and their conformation must be good, but at that we are often confronted with one that will interfere or forge; so if you have the time to spare we will get the animal you refer to and we will shoe him, and probably follow your advise, as far as possible. But understand it will have to be a plain job." Well, all they did was to dress the foot down to where it normally belonged, and then fitted a plain shoe to each foot, and that was all, the colt walked out and trotted without even forging once. So there you are, the chances are that they could not have done any better if they had tried the whole category of shoes on him. They tell me that the only attempt made to regulate the gait is by equalizing the wear of the shoe. If an animal is found that wears a set of shoes unlevel, something must be wrong, and the cause is easily remedied by simply laying the trouble to the foot not being properly dressed, and the cure is simply dressing down the side that shows the most wear.

I believe that if most of us used the same method, instead of using a lot of fantastic shaped shoes, we would probably have just as much, or perhaps more luck with our bad-gaited animals. Use a little common sense and tell the driver to do the same, in hitching and driving, especially if the animal is a young one. No man can shoe an animal so that its gait will be perfect, unless said animal is perfectly hitched and driven with judgment.

Get your feet properly balanced,



so tha tyou will derive equal wear out of both branches of the shoe. Do this without putting an excessively high or heavy calk at any place. You can do this by shoeing the foot according to the way that the animal would wear his foot if he were allowed to travel bare footed for a few weeks. Do this and let him wear his foot the way nature intended him to do, then simply nail your plain shoe onto the foot, without making any attempt to "level" it, and you will find that you have learned something. Do not think that you have done anything wonderful when you put a great piece of iron or steel onto one side of the shoe and then have that animal come back to you in a month or two months with the side that you re-enforced, practically worn out, and the other side untouched, when in fact all you have done was detrimental to the animal. This method is what fills the country full of premature cripples and the mechanic that has the least consecp-tion or knowledge of the anatomy of the limb, or the function of the different bones, ligaments and tendons, would never venture to go as far as to try and "make", as they call it, an animal break over here or there. We may make the weanling or the yearling or the two year old do such things, but it is out of the question in the mature animal, and any animal that does not hit the ground evenly, be it a runner a trotter or a pacer or a drafter, there is no one to blame for it but the horseshoer, and its only a matter of time when this animal is bound to show ill effects from such treatment. We have corns; quarter cracks and splints on the front limb and foot and spavins on the hind limb, where do we find most all of these troubles? On the inside of the feet and limbs. Why? You may ask. Simply because the inside of the foot is invariably dressed too low, and consequently the strain is thrown upon the low side. The wear on the high side and the strain and subsequent rupture of the sensative lamania causes corns, quittors and quarter cracks of the hoof. The strained ligament cause splints, spavins and ring bones and numerous other troubles.

Shoeing An Over-Reacher

A Question and a Reply

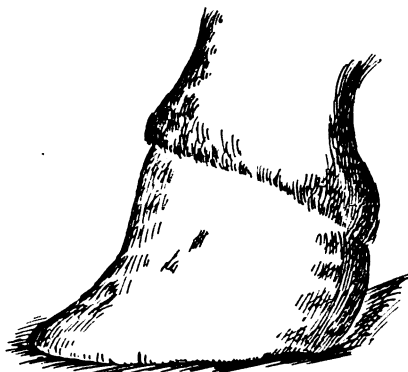
"Tell me what to do when a horse overreaches with the hind feet which hoofs are cut so thin that they bleed. I have tried practically everything that I can think of and I wish someone could tell

me what to do to keep the animal from overreaching. The part of the hind feet which are cut is directly in the middle of the toe, from about half way between the ground surface and the hair-line to the point of the toe. This part being cut and scraped until it bled."

E. W. L., Illinois.

Mr. Franz Wenke Replies

Of course, from a distance, and without seeing the horse, it is more or less guesswork at the best. According to the description, I believe the horse is not so much overreaching as he is dragging his toes on the ground. I have a mule of the same sort right now to shoe. At first, I did try every possible way to shoe this mule for overreaching by giving



THE HIND HOOF IS CUT AT THE TOE BY OVER REACHING

heavy front and light hind shoes. I also put on front shoes with only heel calks, no toe calks, in order to make him break over quick and getting his front feet out of the way of his hind feet, and put hind shoes with only toe calks and no heel calks on, so as to retard the stride of the hind feet. But to no avail. At last, I hit the thing. I am shoeing the mule now with ordinary shoes in front and behind with heel and toe calks. But on the hind feet I put a somewhat lighter toe calk right on the opposite side from toe calks, That is: I put on in this case a No. 3 toe calk on ground surface and a No. 2 toe calk on the bearing surface, and use upper toe calk as a toe slip. Since I have been using these shoes, now about two years, I have not had any trouble with said mule. The mule has to make about twenty-four miles every other day on hard roads. Before using this method the animal could not make two trips to town without coming home almost worn to the quick.

I remember some eight years ago, I had to shoe two mules who also wore their feet in this manner, but they had to go in a sandy road whereas the mule at present works on a hard macadam road. Those last

mentioned two mules I shod a little different. On the hind shoes I welded a piece of flat stock $1\frac{1}{2}$ by $\frac{1}{4}$ inches on the toe in the shape of a toe clip, only I made that clip about two inches high. In using such a shoe care must be exercised not to have the clip pressing on the foot; it has to be fitted nicely to the foot. As a rule, this toe clip, made out of stock $1\frac{1}{2}$ by $\frac{1}{4}$ inches were worn thin in about two weeks and broken off. But the toe clip made out of a regular toe calk always stands till the next regular shoeing. At the present time, I have this mule shod with Neverslip shoes and welded a toe calk only on the upper side of the shoe. I have also found out that after a few shoeings, and when the toe of the foot has grown out again, the mule will go for a time without the device of the two toe calks, but will fall back into his old habits again.

If inquirer will shoe his horse as indicated above, I should appreciate it very much if he would let us know through these columns what success he had with my suggestions.

A Rare Foot Trouble—Broken Bars

DR. JACK SEITER.

In answer to the New Brunswick reader who asks for information on Broken Bars would say; Broken Bars are rather rare, consequently little is heard on the subject.

There are two causes directly responsible for this trouble, one originates internally, and the other externally, but both may, and generally do, originate, primarily, from external causes, such as breaking the bar by stepping upon a stone or a hard mass of frozen earth. This may fracture or lacerate the bar to such an extent that lameness will be the result. Again an animal may step upon some hard body that will not break or cut the bar, but the sensitive tissues underlying the bar will become bruised, and in time supperation will set in and resemble the bruised heel, or corn, at times this supperation is so severe that the whole bar may become involved and loosened.

This trouble is generally found in dry, hard, or contracted feet, and at times the trouble may originate, in this class of feet, with out any external injuries. Of course, we at times find a foot that is kept in good order subject to this trouble, but as a rule the direct cause then is generally traced to external injuries.



The treatment consists of first treating the foot so that it is soft and pliable. To attain this end the soaking tub, moist clay, or linseed or bran poultices may be employed. After the foot is soft enough so that it can readily be cut, the entire foot should be dressed down to where it will normally belong, then thin out the sole and be sure that the broken or bruised bar is cut right out to the very bottom of the trouble. Simply cutting a notch into the bar and separating it will not do, the bar must be cut out from the point of the frog right back toward the heel. If practicable it is advisable to keep the shoe off for a few days at least and continue the soaking or poulticing as the seat of the trouble may have become sufficiently bruised so that a pus formation may have resulted, in a case like this it is advisable to keep the shoe off until the seat of trouble appears sound and healthy, and no exudate or serum is visible. You may have to trim out the bruised or broken parts several times before it will appear healthy enough so as to warrant the application of a shoe.

Before shoeing burning some wax, brown sugar or a piece of gum camphor into the broken part is advisable. To do this simply take a red hot iron and gradually burn the ingredient into the foot until it is all taken up, this will stimulate a new growth and also take the remaining soreness out.

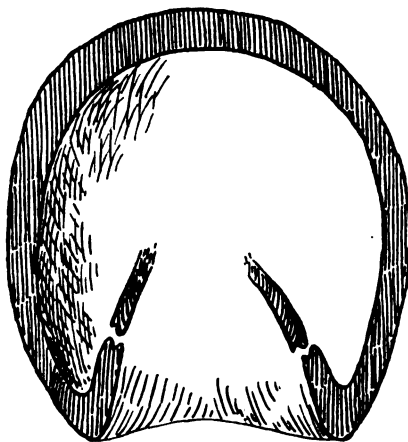
A bar shoe, or a half bar shoe are indicated, fitted plain if possible, or at least the lowest calks that are practicable. Before applying the shoe take the bearing off the quarter of the injured side just a trifle; an eighth of an inch will answer the purpose. Then apply the shoe with a good stiff leather pad, underneath which pack well with oakum and pine tar, or any other hoof ointment or packing that you are in the habit of using.

Remove the shoe at least once a week and examine the part and make sure that the bar is growing down sound and healthy, you may have to pare it out several times and burn in some more of the above ingredient before you will notice any improvement.

As a rule it is more difficult to effect a cure in the feet of a race horse and those of the heavy draft animal that is not put to such strenuous efforts, as the concussion and strain is not nearly so great.

In dressing the healthy, or normal

foot to much stress cannot be laid upon the fact that most horseshoers do too much cutting out of the frog, sole and especially the bars. When these parts are unnecessarily mutilated by the horseshoer, they rapidly dry out and become atrophied, and their resisting power is greatly diminished. And instead of acting as reinforcements and braces to prevent the foot from becoming hard and contracted, the frog being hard acts like stone in the foot and is apt to bruise the sensitive tissues above, and the bars being weakened



BROKEN BARS ARE RATHER RARE

and brittle, are very easily broken or fractured. Keep your knife away from them and you will readily note the difference in a few shoeings.

The Theory and Practice of Hardening

J. C. WEST.

For the best colour to bring edge to, the reader must refer to the table of colour-temper and carbon percentages previously given. If the percentage of carbon in the steel used is unknown, experiment in use can only decide what colour it will cut and "stand." The chisel can now be ground to a cutting edge, and the metal of that edge, having been protected from the "perishing" action of the unavoidable heats, will be of the best attainable for its purpose. The chisel can also be ground many times without any difference being found in the temper and quality of it.

Another and still more exact method of tempering is to use oil or grease in the bath in place of tin, and gauge the heat with a thermometer. Tallow answers very well, and of course the oil used must vaporise considerably above the degree of heat required to give the particular temper needed. A gas-jet or a blow-lamp is far the best for heating a grease-bath, as a forge for the purpose is very liable to cause the bath to take fire, the heat being much less controllable. A stopper should be made to fit close in the mouth of the bath, so that, should it catch fire, it may be extinguished without danger by merely inserting it and removing the gas-jet or blow-lamp, which should be arranged with this accident in view.

To gauge the same degrees of heat in

molten tin is such a risk to a thermometer, owing to the quick transference of heat—the specific capacity for heat being so much greater, and its conduction so much quicker, than oil—that, even with the greatest care, the thermometer is sure, sooner or later, to meet its fate. But a word of warning as to the thermometer is necessary. The ordinary cheap instrument made of common glass will most likely crack at the line where hot grease and air meet the first time it is used. I know this by experience, unfortunately. There are thermometers made of special kind of glass intended to withstand this usage.

A reference to the table of temper-colours will show that from a very light straw-color to a very dark blue takes a rise of 180 deg. F. Yet only ten colors and shades are shown. We therefore have only ten working degrees of hardness—an average of about 18 deg. F., between each temper to do the thousands of services we ask of steel. When it is seen that a shade of yellow perceptible to the eye takes 40 deg. F. to produce it, and it is remembered that the shades of yellow look different in a bright and a dull light, it is no wonder we grind away in waste so much of our tools through their getting blunt earlier than need be, by making them too soft, because we are afraid they will "snip off" by being too hard. I once heard a fitter say he had only had one really good chipping-chisel in his life, and the foreman said that he "was blanketty lucky to get that."

By the use of a tempering bath, gauged by a thermometer, we can always get exactly the temper that experience has shown is best, provided it is the same grade of steel, hardened in the same manner—and, even if not exactly the same, certainly very much nearer than with the hit-or-miss methods of eye service. I am sorry to say one sometimes hears the nonsensical assertion made by workmen, who otherwise are skilled and competent, that they can get a required hardness (of temper) at one operation by judging the heat on quenching. "Dull red," "blood-red," and so on are given as the guide by which such a much-to-be-desired result is attained.

When it is remembered that hardening only takes place at or above the degree of temperature indicated by calescence (i. e., when the carbon, in carbide form, partially dissociates into a combination combining with the whole mass of the steel, but in lesser proportion of carbon to the iron, becoming hardening carbon, as it is termed); that the calescence-point of water; that the dissociation and recombination takes an appreciable period of time measured in seconds; that the length of time allowed to elapse in calescence before quenching would determine the amount of carbide transformed into hardening carbon, and thereby the temper, or hardness; that the eye-gauging of the most experienced steelworkers, tested with red heats against a pyrometer, has been proved to fall within 60 deg. C. higher or lower, even in the same light—it will be seen how baseless these assertions must be. So many "impossible" things have been accomplished that some day a gifted brain may devise appliances for quenching at the exact moment, and instruments for ascertaining that moment that will enable steel to be hardened at the red heat exactly when the hardening carbon is in the necessary proportion for obtaining the



desired degree of hardness. But no distance judge will ever discern a range by using his eye with the same exactness that a range-finder does, and to hit our mark—degree of hardness—we shall need something much more accurate than the eye. Doubtless when it ever is possible to obtain the degrees of hardness required by quenching only, that steel will be tougher, hardness for hardness, than steel first quenched dead hard and then tempered, as some of the coarsening action of a higher heat to quench at would be dispensed with, and the liability to crack at that higher would be lessened; but—the time is not yet.

But to return from theory to practice: Assuming that the temper we want is that shown by a medium straw, which is attained at a temperature of 460 deg. F., the thermometer must be inserted in the bath, and watched until 460 deg. F., is registered. The chisel is then inserted, which will cause the thermometer to go back several degrees. As soon as it rises to 460 deg. F. again, withdraw chisel and cool it in water. The shank of chisel should now be tempered to a dark blue by the methods before described.

Whilst on the subject of chipping-chisels, it is common to observe a workman put the edge in his mouth for a moment when commencing to use a chipping chisel. He does this from habit, having acquired it as an apprentice, and if asked for the reason for so doing, has generally none to give, or, as an exception, offers the explanation that the moisture of the mouth lubricates the edge and "saves it." The act is right, but the reason given is wrong. It is the warmth of his mouth, not its moisture, that "saves" the edge. Tempered steel is considerably tougher at higher temperatures—that are below tempering heats—and the softening effects are not nearly commensurate with the toughening at these temperatures. In chipping a hard place in a piece of cast iron, I have specially tempered a chisel to a color that would have "fled" in a moment under ordinary temperatures; but by dipping it in boiling water every minute or so whilst in use, I have chipped the casting and preserved the edge. The same applies to the face of a hammer, or any steel article subject to percussion. Even holding it in the hand a few minutes will have some effect. It is quite possible that by using boiling "suds" on a lathe chisel whilst in use, a harder temper could be employed, without the edge "flying," in cases where the material was very hard.

I propose to give one or two illustrations first that admit of full explanations whilst under description, so that the principles may be understood that operate in them, and thus in further illustrations it will only be necessary to refer the reader to these, if needed, where applicable, and thus enable directions to be given that are short, but quite clear. The principles understood, the details of each operation need only be brief, as any variation of procedure is only needed to accommodate differences of shape or size.

(To be continued)

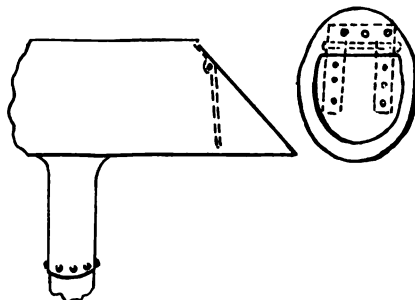
A Safety Blast Pipe Door

BERT HILLYER.

That explosions occur from the gas from the coal in the forge fire,

is a fact well-known to all smiths. But so far the writer has never seen anything in print to advise the smith how to prevent it. These explosions vary from small puffs to reports as loud as a gun. That these explosions do damage is proven by the holes that are found in bellows after these reports; also the twisted blades in the fan of the blower.

The writer remembers an explosion that occurred in a large shop that he was working in that tore apart and straightened out the blast



A SAFETY BLAST PIPE DOOR

pipe; and also blew out the windows close by. The report was deafening. About 15 minutes before this happened, the power that drove the fan stopped and the smiths did not all shut off the slides of their fires. This let the gas back up in the blower pipes and when the fan started up, it forced it back to the fire and caused the explosion. These smiths were using hollow banked fires at the time which does not give the gas a chance to escape like the open fire. In the small shop these explosions generally occur when the smith is out, or busy in some other part of the shop. Some meddlesome pest rakes over some fresh coal on top of the fire, packs it down with the shovel and then starts to blow up, which he does, but not the way he intended to.

Now to make the fire fool-proof and safe, a small gravity door can be placed on the inside of pipe at an angle that it will drop back itself, and that will close with very little air pressure from the bellow or blower. This lets the gas escape when the blower has stopped.

The engraving shows a gravity door on one of the ends of the main pipe where power is used to drive the fan for more than one fire. The dotted lines show the hinged door open inside of pipe. When the blower starts the door swings shut from the pressure of the air. When the blast is shut off the door opens automatically and prevents damage to the blast piping from a gas explosion.

Tightening a Loose Gun and an Improved Firing Pin

L. R. SWARTZ.

Brother Bert Hillyer in the January issue of "Our Journal" has given us a very good plan for tightening loose guns of the pattern described in his drawings. I am glad to know that he is a lover of guns—so am I, having four rifles and two shot guns besides three revolvers in my armory. The barrel on one of these rifles, a muzzle loader, is more than 100 years old. I seldom use it except for target practice or to shoot beeves or to put some poor horse out it's misery.

Speaking of breech loaders, there is a variety of breech actions, different from that shown in the January number, especially on medium priced guns and on some of these low-priced single barrel guns. Some are "double bolt" actions, others "single bolt." Whether double or single bolt makes no difference as to the repair. Most of these guns are fitted with what is known as a "Dolls-head" extension to the top rib and this doll's-head fits into a recess in the frame or part which carries the locks. By examining the accompanying engraving one can see where the points of wear most affect the gun. In these guns the frames are held by the tongue which reaches from the snap into the notch at rear end of bolt.

The parts wear most where the tongue engages notch on bolt; a very little hammering raises a burr which closes the notch enough to hold gun tight as new. To correct side motion, pene the upper edge of the doll's-head and turn bottom side of barrels up and drive a sharp center punch in center of under side of doll's-head.

Care must be used to lay the parts firmly on anvil or other solid place to do the peneing so as not to jar the rib loose from barrels. If this is a little overdone a little filing will bring the parts to fit and the job will wear longer than if barely enough pening had been done, that is, if the filing is carefully done.

It depends altogether upon a man's customers whether it pays to repair any other guns than is own. I occasionally repair guns and pistols, but do it mostly as an accommodation to friends rather than as a part of the regular business. Men of means who really have good guns will pay a decent price for repair-

Among the more beautiful state coaches of the continental Europe



of modern times is that belonging to the imperial family at Vienna. The proportions of this coach are almost perfect, and the finish of the moldings and carvings is exquisite. This coach was built in 1696 and is shaped with all the curves which are familiar to us in cabinte and furniture of the style called Louis XIV. and in which a straight line is so carefully avoided. The body is very deep and longer on the roof than the elbows. The doorway is depressed in order to hide the steps. The panels are beautifully painted with nymphs in the style of Rubens. Indeed, a story is told at Vienna that Rubens painted the vehicle himself, but that is only another instance of the inaccuracy of local traditions, because Rubens died in 1640. The center of the roof is covered with a great imperial crown, and large tassels hang from the four corners of the roof, where a modern carriage or automobile body builder might place lamps. The body hangs very low. The wheels are about three feet and four feet nine inches high and are very elegantly formed with carved rims and spokes. The whole of the woodwork and ironwork is covered with glit, and the panels only are in the colors of a landscape with figures.

Virtually every court in continental Europe possesses one or more of these fifteenth, sixteenth and seventeenth century state coaches, and there are several wonderful specimens to be seen at Lisbon, Madrid, Rome, Vienna, Berlin, Brussels, Munich and other European capitals. The general character of each is that of a rather lumbering body, profusely carved, glided and adorned, placed on a very lumbering carriage gear. On some of them are introduced figures of gods, goddesses and animals, which appear to hold up the heavy body by means of leather braces. Probably the largest of all the royal coaches of Europe is the state coach of England, built for King George III. It is not known who built it. It was designed by an amateur, who could not be expected to consider so much its usefulness as its massive grandeur, which he expected to gain by an exaggeration of some of the principal parts, such as the body the total length and the enormous hind wheels. The coach was built about 1761. Its length is twenty-four feet, height twelve feet, width eight feet, and the weight is stated as four tons.

The Horse's Memory

"Many years ago," said Mr. Gentry of Gentry Brothers: "We had a pony named 'Marie.' She worked in the pony drill. She was a most intelligent animal, but had an ugly head. For three seasons she worked in the act, but when we got other ponies broken in we thought enough of 'Marie' to send her to the stock farm of Gentry Brothers and pension her on hay and clover.

"Five years later, almost to the day, the pony that took 'Marie's' place died on Saturday night. We had no pony to fill the place in the drill. Some one suggested 'Marie.' I caught a train and went to Louisville to meet the pony that was being brought from the farm by a groom.

"We quickly transferred her from one depot to the other, and went to Memphis to meet the show. It was due there Monday. Fifteen minutes before the pony drill I led 'Marie' on the show lots. At drill time she took her place in line, went through the drill, and did not miss a 'cue' from the trainer.



Benton's Recipe Book

A Simple Nickel-plating Recipe is requested by L. M. G. of Missouri. Here is one, I think, will suit his needs. Make a solution of chloride of zinc by taking 10 parts of the chloride to 90 parts of water. Put the chloride of zinc solution into a porcelain or stoneware vessel and add enough sulphate of nickel to produce a strong green color. Now bring the solution to the boiling point and hang the pieces to be plated in the solution. The pieces to be plated will need to be thoroughly cleaned by dipping in a dilute acid, and they can then be hung from a stick or wire so as not to touch the sides of the vessel. The boiling is continued for from thirty minutes to an hour, water being applied to make up for the evaporation. When the articles appear to be plated they should be washed in water in which a little chalk has been stirred. After carefully drying, the articles are polished with chalk.

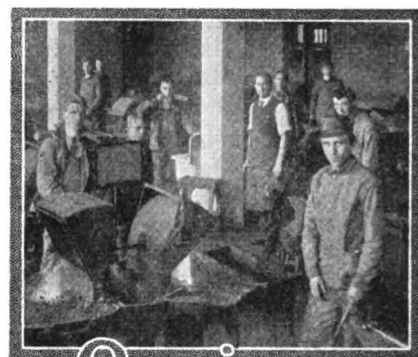
A Non-rusting Soldering Solution is made by mixing one pint of grain alcohol with two teaspoonfuls of chloride of lime. This mixture should be well shaken before using.

To Keep Copper Bright and to prevent

oxidation panit it with a varnish made as follows: Take one part carbon disulphide, one part oil of turpentine, one part benzine, two parts methyl alcohol and one part hard copal. Several coats of this applied to the copper will resist oxidation.

A Welding Compound for use on Bessemer axles is made as follows: Take 7 pounds of dry, sharp sand, 4 ounces of sulphate of iron, powdered, 4 ounces of fine salt and 4 ounces of black manganese. Mix these thoroughly and use same as borax.

To Drill a Hole in Glass is G. L. F.'s puzzle. Here's the how: Take a three-cornered file with a good point on the end and use this as a drill. Lay the glass on a perfectly flat surface that has been covered with a horse blanket or carriage robe. Now begin drilling operations with your file drill and brace, using turpentine as a lubricant. Don't press too hard but let the file feel its way into the glass.

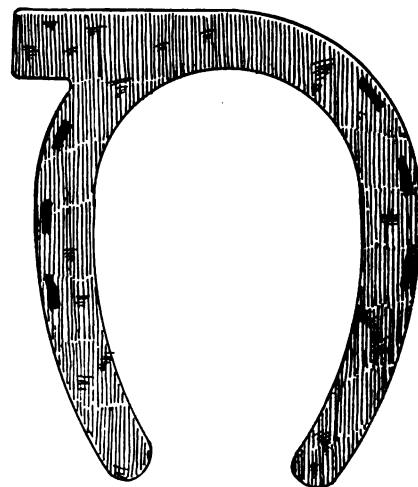


Queries—Answers—Notes

A Horse that Paddles.—I would like to hear from Mr. Monro on shoeing a horse that paddles or weaves; also on cross firing as I like the system he represents. Or can any of the other brother help me?

One man told me to weld a flange on the inside of toe as in engraving, but this makes a horse pigeon-toed. Will be glad to hear from anyone.

A. S. LANHAM, Illinois.



MR. LARNHAM TRIED THIS SHOE

Welding Self-Tempered Steel.—Please allow me a little space in your valuable paper as I have been a reader for a good many years and it is the best paper for a mechanic that one can get. I would like

to know if self-tempered steel can be welded. If any Brother Smith knows, can he also tell me the kind of compound used?

S. M. LEBLAC, Nova Scotia.

Oxy-Acetylene Welding Flux.—Please do me a favor if you can. Give me a recipe of how to make the welding flux to

same as you want to be treated.

P. A. STROHL, Nebraska.

Thirty-nine Shoes in Seven Hours.—I never see anything from the brothers out here in Nebraska. Business has been rather dull here for a year, but looks better now. I am a new man at the business. I have only worked at the trade six years and know that there are lots who can beat me; but will give you an idea of what a fellow can do if he wants to work. Now, I only weigh 130 lbs. and am 42 years old and on Jan. 3, 1916, I began to fit shoes and nail them on at 9:30 in the morning and at 4:30 in the evening I had fitted 39 shoes and nailed 37. Now, I would like to hear from some other brother. I think it is a fair day's work. We get fair prices for work, but collections are slow.

O. A. WELCH, Nebraska.

On Shoeing and Length of Tires.—We all get hung up on a job once in a while, or so near to it that we are liable to dream about the job before it is finished. For instance, a man came to my shop one time with a road horse that he said was a bad one to interfere. She had been shod by a number of shoers, but still she interfered so badly that she had to go without shoes. He wanted to know if I could shoe her so she wouldn't interfere. I told him I didn't know but thought I could. I shod her this way: I pared the feet as near level as I could and with an extra light shoe I fit the foot as follows: I set the toe calk about two-thirds of the way across the shoe and let it project out over the outside about one-half or five-eighths of an inch. Then I clipped off one-half inch from the inside heel of shoe and put on a short side calk and turned the outside calk well out and kept the inside of the shoe as straight as possible. She goes clear, has all healed up and doesn't touch a hair. Now, Brothers, if you have an interfering horse that toes out, don't be afraid to try this.

Now, for cutting a tire the right length: First, get the wheel in shape to receive the tire by wedging the felloe down tightly on every spoke, leaving the thickness of a thin saw carf between the joint of fellows on one end and the other end tight. Now, see that the spokes do not project out so the tire will ride the spokes or, on the other hand, do not have them too short or the wheel will become what some call felloe-bound. Well, so much for getting the wheel in shape. Now for cut-

wheels. The heavier the wheels the more draught you can give.

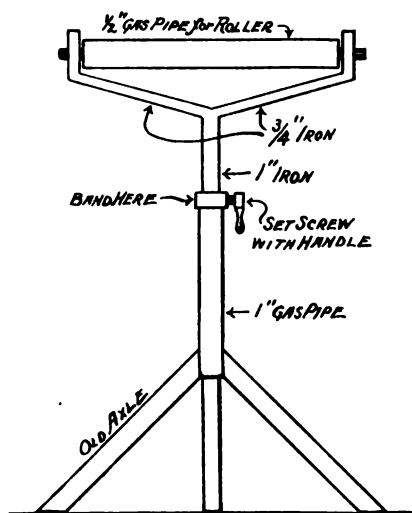
Let us hear from all the boys and make the Editor earn his money. I think he likes it so give it to him on first one subject and then another and maybe they will come in so thick and fast that he will have to publish THE AMERICAN BLACKSMITH twice a month. I hope so. I could hardly know how to keep house without it. I sincerely wish it came to me twice a month instead of once. I think I have every issue for the last fifteen years, so you may know that I think a lot of them or I would not have kept them. Every once in a while I get them down and review. I think THE AMERICAN BLACKSMITH ought to be in the home of every up-to-date smith.

WILL CUMMINGS, Pennsylvania.

Horseshoeing and Two Shop Helpers.—I notice in January issue Brother Olson would like to hear from other smiths in regard to leveling run over feet. If my experience is worth anything to him or anyone else, I will give it. Will say I think he is right in most cases. Just because the horse's foot is run over and the shoe worn thin on one side, there is no reason for paring it the same as it was, which only makes it worse. Pare high side waste and reinforce low side. However, there are cases which we should treat differently. If the horse has stiff pastern joint from different causes and after being pared level, steps on run over side first, and then rocks over on high side and scarcely touches on that side, the chances are that it will go lame if we undertake to straighten it by paring it level. We must use our own judgment in such cases. Will also send picture of two of my helpers, which I like very much. They are always standing around ready to help if needed. The first is my helper for my anvil, drill and woodworker when working long stock. I think the engraving will explain. The second helper is for putting on wagon rims when they refuse to go up to their proper place. It is adjustable for all sized rims. Another thing I like about them besides their readiness to help is they are not very high priced.

G. N. SIDERS, Ohio.

Questions and Prices from Missouri.—I am located here in northeast Missouri; have been here thirteen years and have a shop 24 by 48 feet. I will name a few machines that I have; a 10 H. P. I. H. C. gas engine, a French stone buhr three



A PRACTICAL SHOP HELPER

weld cast iron, and also steel with by means of the oxy-acetylene torch.

C. J. FORSLAND, Minnesota.

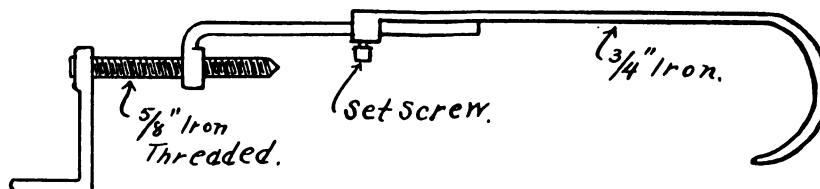
In Reply.—For use with cast iron, we would suggest your trying the following mixture: Equal parts of carbonate and bicarbonate of soda, 15% of borax and 5% of precipitated silica. These ingredients are thoroughly mixed and are used the same as any flux in oxy-acetylene practice. We would warn you in this matter of using flux with cast iron, however, that you use the flux very sparingly as too much flux causes the iron to harden which naturally makes it difficult to drill or to machine.

For steel welding no flux is necessary, although if the metal does not run readily, borax or even ordinary salt may be used sparingly.

SERVICE BUREAU.

Some Good Resolutions.—Here are my "New Year Resolutions." They may interest other members of the good craft:

1. Learn your trade thoroughly before going into business.
2. Do your work right and charge accordingly.
3. Keep the best of material that the market has.
4. Always figure on your work and material so you can come out ahead.
5. Don't employ booze-fighters and cigarette smokers.
6. Look out for dead-beats. Trust only people that come within the reach of the law.
7. Don't patronize mail order houses.
8. Be honest to yourself. Don't cuss and swear. Speak a good word of your neighbor.
9. Keep your shop clean and keep your tools in good repair. Don't allow any loafers around.
10. Don't abuse the horses when shoeing them. You can win any brute by being kind.
11. Be kind to the poor and donate according to your means.
12. And above all, be a man, pay all your honest debts and don't lie. Treat your fellow men and your customers the



A HANDY TOOL OR THE WHEELWRIGHT WHEN PUTTING ON RIMS

ting the tire in the straight: Place the tire on the floor and the wheel at the open joint on the tire and run around straight. Don't zig-zag, but run your wheel straight until it is around to same joint again. Make a mark at the end of felloe next to you. Don't measure the space between the felloe and then condemn the rule, but just measure the felloe and then add three times the thickness, less the draught and mark to cut off and you are right. Cut off and weld up and leave time same size of wheel with a little red heat at weld and you have draught enough for buggies'

feet in diameter. I grind cornmeal, graham flour and all kind of feed. I have a corn sheller, a disc grinder, a drill, a rip saw and a jointer. I can run all these at once. I handle motor oils and all kinds of machine oils, machine repairs and stock poultry remedies, as a side line and it pays.

I want to ask the brother craft a few questions, First, how to temper a cold chisel so it will stand the rough use around the shop without bending or breaking. Second, how to temper mill picks so they will stand to pick a French stone



buhr. I have seen two or three blacksmiths try it, but failed. Third, I would like to know a sure and correct way of setting the skeins on a wagon axle; so they will track and have the right gather, etc.

We get very good prices here; but it is like all other places there is always a price cutter present. I will name a few of our prices: Shoeing old shoes, 25c each; new shoe, 50c each; plow work pointing, \$1.00; pointing shovels, per set, \$2.50; sharpening, per set, 50c and 60c; sharpening plow lays, 12-inch, 25c; 14-inch, 30c; 16-inch, 35c; wagon axle, \$2.50; tongue, \$2.50; circle hound, \$3.00; buggy pole, \$2.50; shaft, \$1.25, and so on down the line about the same way.

I think we have an awful good journal, I always like to read the letters the brothers write. THEO. CHEWNING, Missouri.

Thanks to Mr. Wenke.—In reply to Mr. Wenke—his idea works all right; but I note that Mr. Wenke states that he had a mule who had the same thing. But one

than from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch. The tool should be very carefully heated so as not to heat it too hot on the extreme end. When cooling dip into bath for an inch or two and draw temper to a dark straw color. F. M. J., Pennsylvania.

Mr. Bundy's System.—As I sat reading "Our Favorite Journal", I came across Philo Bundy's little story. It makes me smile to read some of the stories one reads about bar shoes. Now, I would like to ask Mr. Bundy if the shoe and the treatment that he had reference to in the January number of THE AMERICAN BLACKSMITH, was tried on somebody else's horse or was it on his own.

I will say if a bar shoe is put on right it is the best thing that can be used on a contracted foot and is the only thing to put on a colt for the first shoes. Any smithy that has common sense about a horse will agree with me, for a colt without any shoes is walking on the whole of his foot and when you put an ordinary shoe on with nothing but heel and toe, he has nothing but the thin wall of his foot

shoe to prevent it from springing, but contraction is the opposite. The foot is hard and will not spring, so if you place your heel calks as far apart as possible or as far apart as the center of the shoe and pare the foot down well, there will be no trouble with contraction.

A few of the main features of horse-shoeing to be followed are these:

Let your shoes go back as far as the back edge of the foot. This will take the pressure off the heels and keep the toe from growing and cause the heels to grow.

Always keep the foot level and make the horse wear his calks equally. If one side grows down more than the other, this tells you there is not enough pressure on that heel or toe. Suppose the horse wears off his outside heel, he would wear off the outside corner of the calk on the outside heel and interfere with the toe. To remedy this, put the toe calk to the outside of the center and put the inside heel calk close to the frog and turn the outside heel calk out according to how bad the case may be.

Another main feature is to have the shoe lay level on the foot before you nail it down. This is not done by 90% of blacksmiths. HANS MEYER, Michigan.

A Barbed Wire Stretcher.—This consists of a good, stout pole, about five feet long. One end is fitted with a spike and band or ferrule. About 12 inches from the end is fitted the gripper, made of $\frac{3}{8}$ -inch rod as shown at B. This piece is fastened to pole by means of eye bolt and nut.

In making the stretcher, have rod have rod bolted from end of pole about same the distance as rod is long. Can stretch to end post and by using a wire grip it can stretch smooth or woven wire. It is handy to use, easy to make and I pass it around for the good it may accomplish. J. A. MILLIKEN, Missouri.

A North Carolina Price List.—My equipment is only of the ordinary that most any shop is obliged to have. Not the latest, neither the best, but I try to have a place for everything and everything in its place. And keep my shop clean. I could never work with a lot of trash and refuse under my feet as I have seen some try to do.

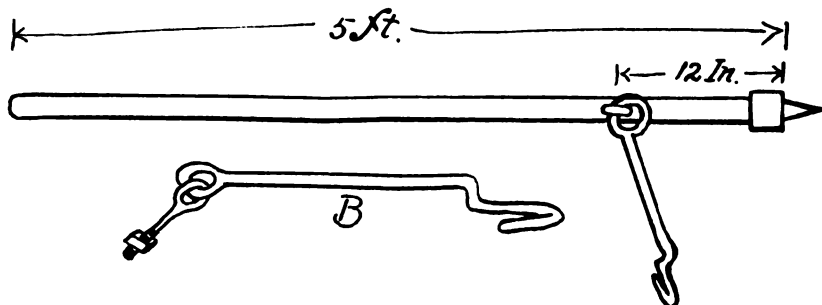
My prices are as follows:

Horseshoeing, 2 feet, 50c; 4 feet, \$1.00. Shoes nad nails furnished by me. Horseshoeing: 2 feet, 35c; 4 feet, 70c. Shoes and nails furnished by customer, allowing the customer, 15c per pair for his shoes and nails. A little more than cost. Resetting old shoes, 2 feet, 25c; 4 feet, 50c. Just half the price of new shoes as I consider half the work already done. Buggy spokes put in, for $\frac{3}{4}$ inch to 1 $\frac{1}{2}$ inch, 10c each and 50c for setting or shrinking on tire. Spokes from 1 $\frac{1}{4}$ inch up to 2 $\frac{1}{4}$, 12 $\frac{1}{2}$ s to 15c each and up according to size. Rimmignig buggy wheels: Whole rim, \$1.00; $\frac{1}{2}$ rim, 50c and 50c for shrinking tire. Shrinking one horse wagon tires, 50c each. Buggy shaft and bars, 50c each. Buggy shaft singletrees, 50c each.

Painting buggies, \$5.00 to \$22.50 according to the kind of paints used. Paints furnished by me. Painting buggies paints furnished by customer, \$3.00 to \$8.00. These are just a few of the many things and I will stop here, as I think this will give an idea to my prices.

E. M. SMITH, North Carolina.

Question on Shoeing, Plow Work and Chimney.—I would like to ask you a few questions: How do you pot metal



AN EASILY MADE WIRE STRETCHER

thing this horse does not do and that is drag his feet. It is overreaching for he is clipping all the time. But we can let it go at that. It is a very good idea.

E. W. LAMPE, Illinois.

On Prices for Work.—There isn't any existing trade that has a greater license to demand a fair price for work than blacksmithing has. After we are able to demand the price, next comes how to charge accordingly. This is, in my judgment, the success of business. During the past wheat harvest, a customer of "yours truly" had the misfortune to break the drive shaft on his binder. He couldn't get another and brought it to my shop for me to weld. I charged him \$1.00, and he paid very readily. The same day a man putting up wire fencing broke a spud. By the way, the spud was the same size as the shaft in the binder (both 1 $\frac{1}{4}$ indidia). It took no longer to mend the spud than it did the binder, but I charged 25c for the spud and made a satisfactory profit. Now, I would like to hear some argument on questions of price similar to this.

BERT J. TOREY, Michigan.

Tempering Stone Cutters' Tools.—I would ask the process and solutions for sharpening nad tempering engravers' tools, that is I mean granite and marble workers' tools and tombstone engravers.

We have in our town a tombstone manufacturer who has to send all his chisels and cutters out of town to have them dressed and tempered. Now, I would like to hold that business here. If I can give them good work, therefore, any advice will be gratefully appreciated.

GEORGE BEVER, JR., Iowa.

In Reply.—When hardening points and chisels for the stone cutter it isn't necessary to heat the tool any further back

to hold the weight of the colt. I hope you will publish this for the benefit of such horseshoers as Mr. Bundy.

HOWARD KELENBENZ, New Jersey.

A Few Collection Suggestions.—I would like to know how the "Boys" collect and how they do it. I have to collect once a year and I have my shop in the country and generally have a hard time. I think the best way is my way and I have no trouble. I pay \$11.70 and pick out the sorriest customer I have and get after him to pay. Then if he lies to me two or three times, I just watch my chance and get him in a corner nad ask him what he is going to do and if he shows fight, I just land on him and then make him pay the fine just as I do. Then I tell him I am going to whip him every time I meet him until he pays me. The news will spread and the other fellows will come and settle as soon as possible. And every time you make him pay and give him a piece of your mind, you make a friend. Now, some of the poorest people are honest but simply cannot come up with the cash. Take anything they have; old iron is very good. It won't rot or shrink. I pay 10 and 20 cents a 100-lbs. and you always "come out" with it as you can find many good pieces. Or, if they have a pig, or some eggs, wood, cows, corn tops, potatoes, or a colt or horse or a sheep or goat, try and trade. I have made more cash money in trading with land and horses than I ever made in my shop.

ED. GRIMM, Texas.

Bar Shoe not for Contraction.—In regard to horseshoeing, I don't see why anybody would shoe a horse with a bar shoe for contraction. Where a horse has a weak foot you have to use a bar



horseshoes so they will wear sharp? Which is the easiest way to steel plug horseshoers? What kind of steel is best to use old mower section or blade from hack saw? Which is the quickest way to put in wagon tongue? The best way to square it up? Where can I get a plow lay frame so lays won't warp? What is best to put in the water to harden lays and cultivator shovels, points and brakes? Which is the best way to build a chimney; the one I have allows the smoke to come down, it doesn't draw right. I have the smoke right, but it won't go up one chimney. The other forge runs to chimney with pipes. The smoke goes up, then it comes down. It was built when I bought the shop. WM. OLSEN, South Dakota.

In Reply.—Pot metaling consists of simply heating the calks to a good red and then rubbing them with a piece of heated pot metal. To steel-plug calks—

do you add freight to your inventory as all of us take stock at just what it costs us at the wholesale house? Also do you charge freight on returned goods the same as you do on goods received?

BAUN BROTHERS, California.

In Reply.—The usual practice is to charge or add freight to the invoice cost of the goods. Carting and drayage is treated in the same way as is also parcel post and express. Freight and all of these other items simply add to the cost of the goods and must be treated as such.

Freight on returned goods, however, is charged to the expense of doing business. It cannot reasonably be added to the original cost of the goods so returned. There does not seem to be any reasonable argument against this practice which is followed generally by business houses everywhere.

SUBSCRIBER'S SERVICE.

Shoeing Run-down Feet.—In answer to Brother Olson on shoeing run down feet, I have been shoeing horses for sixteen years and my experience with run down feet is about the same as Brother Olson. I have been shoeing a horse whose hind feet were turned in until he would tramp on his ankles and his owner brought him to me and wanted me to shoe him. I removed the old shoes and the insides of the shoe were worn out and the outside was not worn at all. So I took a new shoe and fitted it and taking a piece of horse rasp, drew it down the width of the shoe and welded a two-inch piece on the inside of the shoe and then pared the outside just as low as I could. Then I pared the inner part of the inside of the foot then beveled the shoe so that it would press the wall out, then nailed it on, leaving the back nail out on the inside so it would press the hoof out. I have been shoeing the horse eight months and his feet are straight and he never tramps his ankles at all.

J. N. POOL, Texas.

A Texas Shop.—As I have just sent in my subscription for another year for THE AMERICAN BLACKSMITH, I am sending a pencil diagram of my shop. I have been in the blacksmith business for myself three years and find THE AMERICAN BLACKSMITH one of my best friends. Don't see how any smith can get along without it. We are doing a good business here, but prices are bad. We do a general line of work and auto repairing on the side. We have a big shop and work two men the year round. As I get so much real help from THE AMERICAN BLACKSMITH, I must say let's all join hands and get its real value. The auto hints are worth the price of the paper and there are many more that are good.

WHITTISE BROTHERS, Texas.

Remember this when you are tempted to follow the lead of a price-cutting competitor—if you excel in service and quality, you need never be low in price.

Are you attempting to increase your profits by cutting down your costs? If you do not know your costs, how can you decrease them? The matter of more profits begins with an accounting system that really accounts.

Do you know there is danger of your doing too much thinking about your business? If you think you are making a profit, why not make sure and actually KNOW. A little more of knowing will show you that you have not been doing the right kind of thinking.



The Automobile Repairman

How "Our Journal" Helps.—The writer is nearly 50 years old and has been at the blacksmith business for 30 odd years. We do everything that comes along for repair and built some new wagons and sleds and a patent hoe, and do woodwork and painting. But this automobile work bothers me as we put in an oxy-acetylene welding plant and a lathe last year, and are doing quite a little auto repairing, but we have lots to learn about it.

When I had an Overland car come in the other day where the owner had let crank shaft piston boxing bolts come loose, it knocked the end out of the cylinder, went through upper and lower sections of crank case, broke a cylinder ring, burst a chunk out of follower head and bent piston, and broke boxing and cap.

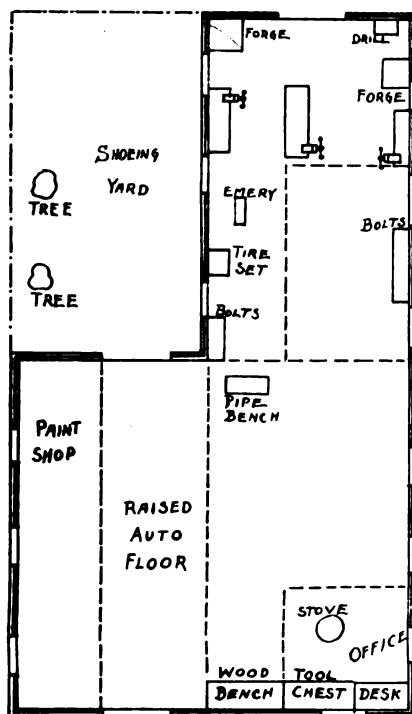
Now, you see a man in a little country town shop is up against something when he faces a proposition like the one just mentioned, especially with practically no experience. But a recent issue of THE AMERICAN BLACKSMITH related a similar experience and it was quite a help to us. We hope to see more of the auto repair business in "Our Journal" and if I can be of any help to anyone along any line, I am willing to do all I can for them. I will answer any questions on plow work, forging, wagon building or repairing, painting or welding, with the gases and will write on any of the subjects upon request, stating information wanted, as I have had lots of experience in the smith shop. We have a fully equipped shop with hammer engine, lathe woodworker, mortising disc lathe, power drill, power fan for one fire, stocks for shoeing, Presto welding machine, shears, tirebolts; also a feed mill, 16 H. P. engine in mill; 3 H. P. engine for shop, and a 1½ H. P. engine for special work.

H. A. LAW, Missouri.

Polishing the Automobile

L. M. HALVIN.

The automobile repairman, if he is to offer complete service to the automobile owner, will need to know something about how to brighten and renew the polish on the body of the automobile. Simply because the body appears dull and lusterless is no reason to suppose that it will require a coat of paint or varnish in order to restore its brilliancy. If



THE FLOOR OF A TEXAS SHOP

heat calk, split with a thin chisel and insert a piece of mower section. Then re-heat and weld up and shape. Frames and clamps for holding plow lays are sold by jobbers and makers. See advertising columns. Try a strong salt brine with a little saltpeter in it for hardening lays and shovels. Your chimney question is not clear. Better send a sketch of your chimney and the pipes going into it. Does your chimney act the same no matter how the wind is? Are there any building next to shop that are taller than the top end of chimney? What is size of flue? Question on wagon tongue is referred to some woodworker. L. H. J., New York.

Freight Charges and Accounting.—The other day some of the business men here in town were talking over business matters, etc., and amongst the questions that came up was this one: Is freight charged to the expense account or is it kept separate? Some one said they kept freight, express and parcels post separate, then we wanted to know to what freight was added or from what deducted at the end of the year. Also when you take stock



the body has not gone too long and has not been exposed to nature's elements to an unreasonable degree, an application of some suitable body polish will usually brighten it considerably.

Dust, rain, sun and mud are all enemies of the high gloss finish on the automobile. Washing an automobile is usually considered such a disagreeable job that the automobile owner will let it go just about as long as he can. Procrastination in this case allows nature's elements to get in their very damaging work on the fine finish of the car and after this process is repeated several times, the auto owner wonders where the high gloss finish has gone which he purchased with the car.

It is here that the progressive auto repairman can come to the auto owner's aid and in doing so, incidentally gather a few shekels into his own pocket. To proceed with the rejuvenation of a motor car body, it is, of course, absolutely necessary that all dust, dirt, grease and mud be removed from its surface and that the part to be polished be carefully dried. A number of polishes can be used and there are practically no end of furniture polishes on the market. Polishing wax is also used to some extent and seems to be very satisfactory. There is no reason why the automobile owner cannot make his own polish as the ingredients of these polishes are every inexpensive, and if he has any considerable amount of work to do, he will not be paying out any great amount for polish.

A very good polish that can be used on practically all kinds of varnished surfaces is made as follows: To 2 quarts of turpentine, add $\frac{1}{2}$ pint of paraffine oil, $1\frac{3}{4}$ ounces of oil of citronella and $\frac{3}{4}$ of an ounce of oil of cedar. This mixture is well shaken while using and is applied in the usual way, using a soft flannel cloth for polishing. In using this or any other polish, do not be afraid to mix with it plenty of "elbow grease." Used in this way even an old, lusterless car body can be restored to a certain degree of brightness and freshness.

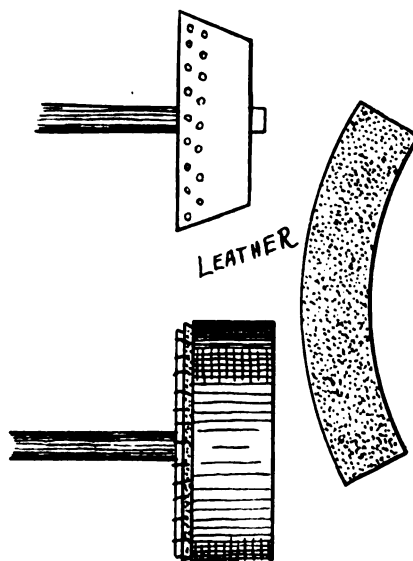
A Clutch Repair on a Pierce Car

L. R. SWARTZ.

The car was a Pierce, seven-passenger that had been out a couple of years. The clutch had been faced with new leather on male section a couple of months before, but the

leather let go from the cone and was torn to pieces. According to the owner and the chauffeur, they had done the job themselves and much care had been taken to make a good job of it, and I believe this was true. They had procured a new clutch leather from the factory, cut to fit, at a cost of \$2.75 and they had fastened it on with shellac and the usual pegs. Then they put it into a form under great pressure and left it to set up. After that the male section was swung in a lathe and the leather turned down to a true fit and surface.

All of this was good practice and would certainly have made a good



HOW THE LEATHER COVERED CONE-CLUTCH WAS RE-PAIRED

job if they had removed the "fleshings" from the leather before applying the shellac. These leathers are cut from sides of oak tanned sole leather. On the flesh side of sole leather there is always a layer of loose fibrous matter that must be shaved off to get to the solid body of the leather. Part of the trouble was the giving of this "fleshing" under torsion and pressure. Another cause was the clutch gripping harshly. They had driven pieces of clock spring between the leather and the cone with the back out so as to give a more elastic grip.

Of course, these springs not only loosened part of the leather from the cone, but also permitted the sections of the clutch to slip more than they should before carrying the load. This slipping helped glaze the face of the leather.

Still another cause of trouble was in trying to use the clutch as a brake in going down grades. When I

gathered up the pieces of the leather, I found that the face was badly glazed and slightly burnt. Not having a new leather to fit, I decided to sew the pieces together and replace the old leather on the cone.

I shaved off all the loose fleshings and scraped the glaze off the face of the leather and curried it up with a rasp and piece of coarse emery cloth. Then I sewed the pieces together and ironed into the flesh or back of leather some stiff grafting wax with a hot iron—just enough to fill the pores of the leather on that side for about $\frac{1}{16}$ inch. This gave the leather a good grip on the cone. I also treated the face of the leather with a little castor and neatsfoot oil mixed and left the leather to lie till morning before putting on. (This job came in at night and the car was hauled into a barn for repair).

When it came to putting on the leather we did no tearing down, but forced the clutch open to the extreme limit and slipped the leather into place. Then by working from the top side fastened the edge of the leather with No. 18 copper wire through the first row of holes, making the tie on the inside of cone next to the shaft. All these wires were bedded in the leather flush with the face so as not to interfere with the working of the clutch. Then the clutch was set tight and all the other holes were filled with brass tacks clinched against the face of the female section.

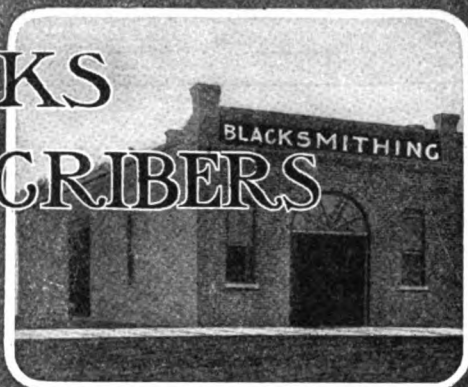
When replaced, the chauffeur wanted some pieces of spring to drive under the leather, but I had none—I told him that if the friction surface of a clutch is kept in condition, no springs are needed, if the clutch is rightly handled.

To say the truth, I was a little anxious to know just how the wax backing of the leather would behave in service. After the repair was made, we invited all the bystanders to jump on or hang on and we would take a ride. We run about three miles, $\frac{1}{3}$ of which was a heavy grade, and she did finely. Before attempting to make that fix, I had reasoned that in that pattern of clutch the grip would be nearly the same on both sides of the leather, and the leather being tightly clamped between both parts of the clutch, could not easily get out of place or slip.

In preparing leather for facing cone clutches, it is necessary to remove all the loose stuff from the flesh side of the leather and also to scrap the grain or hair side.



TIMELY TALKS WITH OUR SUBSCRIBERS



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A New Series of Automobile Repairing

There is today perhaps no man more competent to write on the subject of automobile repairing than Victor W. Page, and we are very glad to announce that Mr. Page is to write a series of articles on the subject of automobile repairing for THE AMERICAN BLACKSMITH. His first installment appears this month as the feature article of this automobile number. In this first article Mr. Page goes into the details of equipping a shop for automobile repair work. In this article he tells you what you should do and what equipment you should have in order to do automobile repair work and from this beginning, he will go into the details of repairing, adjusting and caring for every part of the motor vehicle. In the May number, he will go into the details of putting the car in commission and tuning up the automobile engine.

This series of articles by Mr. Page will appear in THE AMERICAN BLACKSMITH during the next year or more and should give our readers just the information they have been looking for. This series of articles should enable the general blacksmith who is called upon to do an occasional job of automobile repairing to grasp this opportunity for added and larger profits and to make a success of the automobile and of his business. The blacksmith who is advantageously situated to handle this work should certainly not allow this opportunity to get away from him.

Even to smiths who are not seriously considering the big opportunities in the automobile repair work, will find Mr. Page's articles of considerable interest and value.

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When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon him showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

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The Shop Number

If you have not yet sent in something to the Editor for the Big Shop Number which is now in preparation, do so immediately so that this big issue will not be published without something from you, about you or about your shop. If you have a photograph of your shop, send it in for this big shop number. If you haven't a photograph, send in a description of your establishment with a lay-out or floor plan of how your equipment is arranged. We want to make this year's shop number the best and most helpful one that we have ever published. We cannot do this without your co-operation.

Also, don't forget that we are very anxious to learn about any shop-made machines, tools and equipment which you may have. We want to know how you built these shop-made devices because we want to pass these good things on to other craftsmen.

Surely, you can contribute something toward the success of this coming shop number. Won't you send in your item today—Right now, before you forget it?

More Readers

If it were possible for us to increase the number of AMERICAN BLACKSMITH readers between now and a month from now, to just double the number of readers we have at present, can you imagine what an improvement it would be possible for us to make in "Our Journal"? Not only would we be able to give you a bigger paper, but with the increased number of readers, we would naturally be able to publish even a greater variety of articles.

Of course, to double our number of readers in one month may seem impossible, but if each present reader secured but just one reader, there would, of course, be just twice as many craftsmen opening and reading "Our Journal" every month. Surely it is not an unreasonable thing to ask—that you get just one new reader for our paper; furthermore, we will make it worth your while and you will be the gainer, not only in direct reward, but also in the bigger and better paper that must naturally follow.

It is naturally worth something to us to get a new reader, and to make it worth something to you, we will give you six months' credit on your own subscription account for each new subscriber which you send us. If you will do your part, we will surely do ours.



Apologies to Farm Imp. News.

SWITCHING THE SPECIAL ONTO THE MAIN TRACK

General Smiths all over the country are switching the Automobile and Tractor Special onto the Main Line. They want that load of more profits that the A & T Special is pulling. They want that Special to run regularly on the main line. And they are gradually switching—getting the Auto and Tractor Repair lines into their regular shop business. This issue of "Our Journal" tells a good many things about automobile repair work. It tells you how to start, how to take care of the work, how to add this profitable business to your regular lines. If you are looking for Opportunities to grasp—don't overlook this one in the Automobile and Tractor Repair Business. Prepare to get the load of More Profits that this business carries with it. Flag the business and switch it into your shop. You can do it with the proper equipment and knowledge. "Our Journal" tells you what you need.

How to Arrange and Equip the Shop for Automobile Repairing

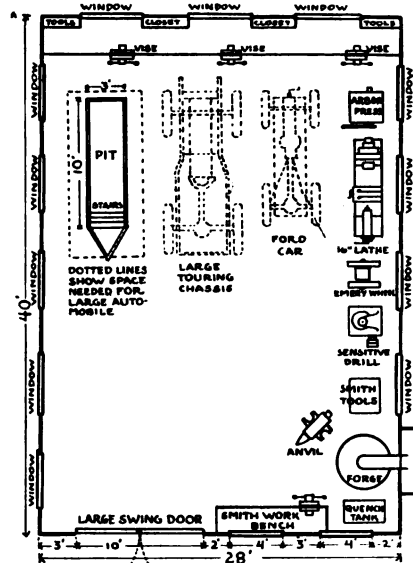
VICTOR W. PAGE, M. E.

THE growth of the automobile industry from small proportions a decade ago to its present amazing size has resulted in a large increase in the demand for automobile repairing and as the sale of cars seems to grow with each passing year, instead of decreasing, it is evident that this growth must be at the expense of some of the other methods of transportation. The blacksmith, carriage-smith and wheelwright who does not start in to learn the principles of motor car repairing is not progressive, nor in line with the trend of the times. The writer does not mean to imply that the automobile will make such inroads into the general vehicle field that it will result in the untimely end of the horse. Self-propelled vehicles have become an important factor in our national life as these are not only used for pleasure, but are being rapidly adopted for business purposes in our cities and on our farms. The development of the gasoline propelled traction engine is also a factor to be reckoned with, so it seems that the blacksmith of the future must not only retain the art and science of his own trade but that he must add a knowledge of the intricacies of automobile repairing to his store of trade lore.

One who is familiar with automobile construction knows that it is a complex assembly of many different groups. The practical all around automobile repairman must not only

must also possess some of the knowledge of the electrician, plumber, wood-worker, rubber-worker, tin-smith and blacksmith. What is more natural, therefore than the repairing of automobiles by men who have made a lifetime study of the construction and repair of other wheeled vehicles and who, through force of necessity, have become excellent mechanics, even though they have depended on tools that were comparatively crude and that have undergone practically no change from the days of the first smith.

Many of the processes incidental to automobile repairing demand finer work and require more delicate tools and measurements than blacksmithing does, but at the same time it is much easier for the smith to become a good automobile repairman than it is for many of the other tradesmen (with the exception of the machinist) who have taken up this line of work. The blacksmiths in our rural districts are those, who in many instances, against their will, have been forced into the study of the automobile because they were the only mechanical men in their respective communities who had sufficient skill to do work of the kind demanded on cars. As establishments are being started from time to time and



**FIG. 1.—A MEDIUM SIZED SHOP FOR
AUTO WORK**

understand the principles of operation of all parts of the mechanism, machine work and use of metal working tools of all kinds, but if he is to be a successful repairman he

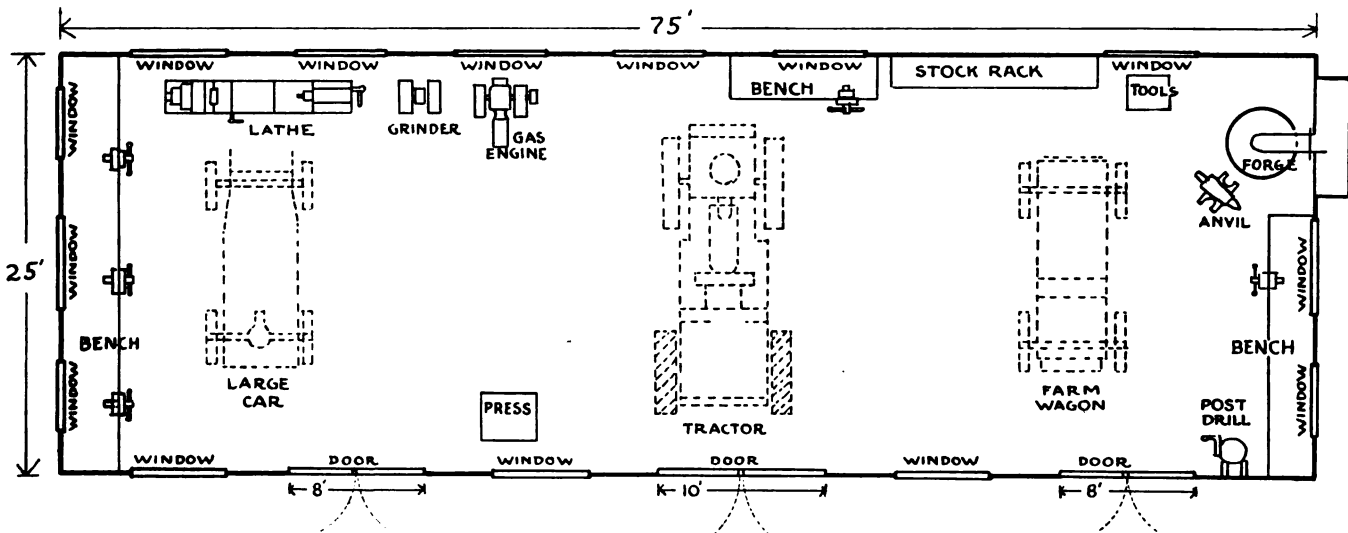


FIG. 2.—A LONG, NARROW SHOP LAID OUT FOR GENERAL WORK, AND AUTOMOBILE AND TRACTOR REPAIRING

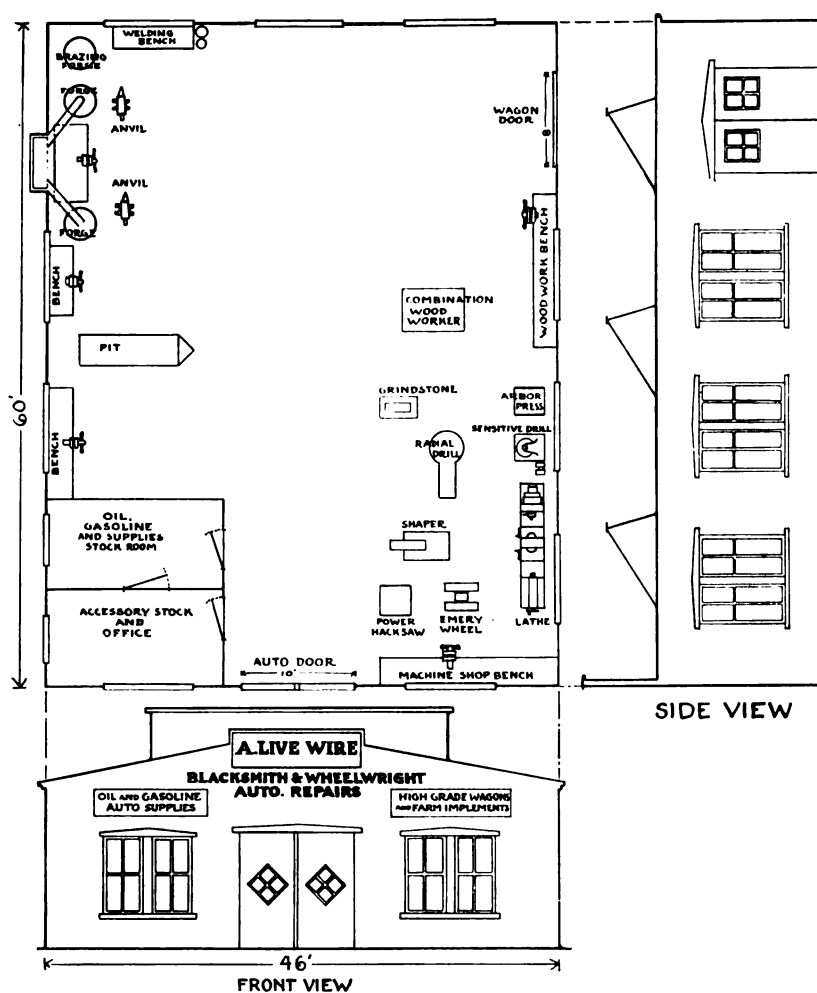


FIG. 3.—A LARGE SHOP COMPLETELY EQUIPPED FOR SMITHING, WOOD-WORKING, AUTO AND MACHINE WORK

many shops are being changed over to care for the increasing number of automobiles sold, some suggestions for planning and equipping various sized shops to undertake automobile work should be of value to those intending to start in this business or to enlarge present facilities to take on the added line. It will be evident that the equipment and arrangement of the shop will vary with the size and the amount of business. Some of the suggestions that follow may be of interest and it is well to note that the proposals made for tools needed, general supplies used and the floor plans are based on actual experience as shown in successful shops.

None of those outlined have facilities for carrying on a garage or storage business because the main requirements for those engaging in a purely storage proposition is merely having sufficient space to hold the cars and to have this space easily reached. A building that would be entirely suitable for storing cars could not always be used successfully as a workshop. The average black-

smith shop is not well enough lighted to be used for motor car repairing without changes in building construction. Old time smith shops are seldom properly heated or ventilated. Another thing that condemns the average wooden structure as used for carriage or wagon shops, livery stables, etc., is that these are very inflammable which is a big disadvantage even if the proper lighting facilities and heating systems are installed in them.

In considering briefly the requirements of the buildings utilized for motor car repair work, the most essential is that the building be absolutely fire-proof, which means that only such materials as steel, brick, stone or concrete be used with a minimum of wood. While in a city shop where space is at a premium, it may be necessary to have two or more stories it is much better to have all departments of the business on one floor when the ground is available. Mechanical work of any kind demands the best of light, and in putting up a structure or in remodeling an old one it is well to re-

member to use plenty of windows with the object of utilizing daylight, as much as possible, and eliminate artificial illumination which is a large item of expense that must be included in the fixed or maintenance charges. The use of more than one story entails elevator service, which adds another expense item to the overhead charges. The best building construction and one that has been demonstrated to be the most satisfactory in large mills and work shops is a steel frame work with concrete walls, pierced by many large windows and having a saw-tooth roof. Brick may be used where these are available in sufficiently large quantities, as to not be too costly and ordinary wooden sash employed instead of the more effective, and in the end, less expensive steel sash. The advantages of the saw-tooth construction over the ordinary skylight is that the sun cannot shine in to interfere with the workmen as the openings all point toward the north. The saw-tooth construction makes a strong roof, one that is easy to keep tight, and what is most important in many States, the light will not be shut out as much by snow during the Winter as with skylights.

Electric light is the best artificial light and the general illumination should be about 140 candlepower to every 200 square feet. Where individual lights are used over the machines and the lighting is

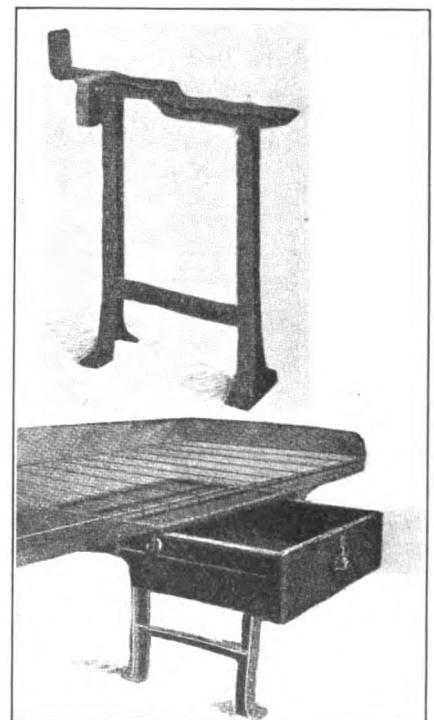


FIG. 4.—CAST IRON BENCH LEG AND HOW USED



supplemented by lamps at the vises and drop lights to carry to the car. An allowance of 100 candlepower of general illumination to 300 square feet floor area will be found ample.

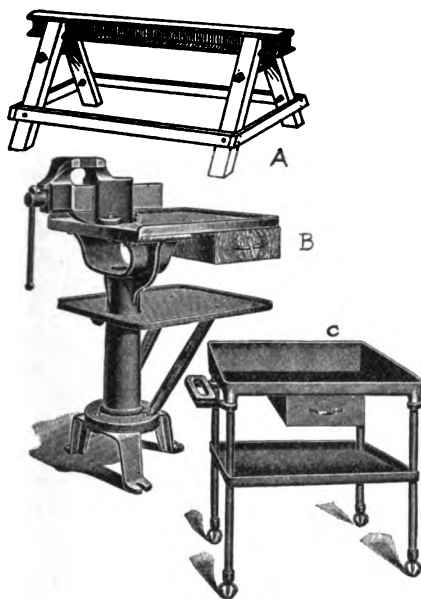


FIG. 5.—A TRIO OF HANDY SHOP HELPS

Lighting of the machine tools should always be on a liberal scale. Where electricity is not available, acetylene gas generated on the premises or kerosene and gasoline vapor lamps may be used though these have the very undesirable feature of increasing the fire risk.

It is very important that the work room be kept at a comfortable temperature, during cold weather. The shop should be maintained at a point between 65 and 75 degrees F. Steam or hot water heat in connection with well placed radiators and piping is much more economical and satisfactory than either hot air or the use of the large coal burning stove that occupies most of the best available space in the old-time smith shop. The heating plant may be housed in a small building outside of the main shop or it may be installed in a special cellar built for its accommodation, even in the small garage. The problem of ventilation is one of considerable importance because when the automobile engines are run they emit large quantities of poisonous gas with the exhaust.

Floor plans shown at Figs. 1, 2 and 3, outline arrangements that would be satisfactory in shops where the automobile repair work is carried on in connection with a general smithing business. The floor plan at Fig. 1 shows a building, 30 by 40 feet which has ample space for the

accommodation of three or four cars, several wagons and still leave room for horses when shoeing is to be done. The approximate amount of space taken up by large and small cars are shown by the dotted outlines. It will be observed that the space at the rear end of the shop is used for automobile repairing while that at the front end nearest the door is given over to the blacksmithing equipment. The reason the automobiles are placed at the back of the shop is that the average automobile job takes longer time than the average blacksmith job, therefore the cars should be placed where they will be out of the way and not likely to be disturbed. It may take several weeks to give an automobile a thorough overhauling so it is important to have these at a part of the shop where they will not have to be moved very often, as it is no easy task to move an automobile chassis when it is partially dismantled and the springs or axles removed. A bench extends across the entire back end of the shop and is for the use of the automobile repairman. A machine tool equipment that contains only tools absolutely needed is ranged along one of the walls, the arrangement being such that all of the tools may be driven from a short length of line shaft.

Larger doors are needed when a

tant and useful adjunct to any automobile repair shop as there are many parts of the mechanism that can be conveniently reached only from underneath the car. The pit enables the worker to stand up and reach any portion of the automobile chassis. It is much easier for the mechanic to work in this position than when lying on his back.

The shop at Fig. 2 shows a practical arrangement where the land available calls for the erection of a long, narrow building. This is 25 by 75 feet. When a building is narrow it is much better to provide a number of doors than to depend on only one door which calls for considerable manouevering to get the vehicles in and out. In the building shown, three doors are used. Two are 8-foot double doors while one is a 10-foot square double door. This shop outlines a good arrangement for a small general shop where the mechanics employed not only have to take care of the usual carriage and wagon work, but also, repair automobile or traction engines. It will be noticed that the building is plentifully supplied with windows and that one end is devoted entirely to the smith shop while the other is used for automobile repairing. The space in the center can be used for any purpose, and will take care of an overflow from either department. In this shop the

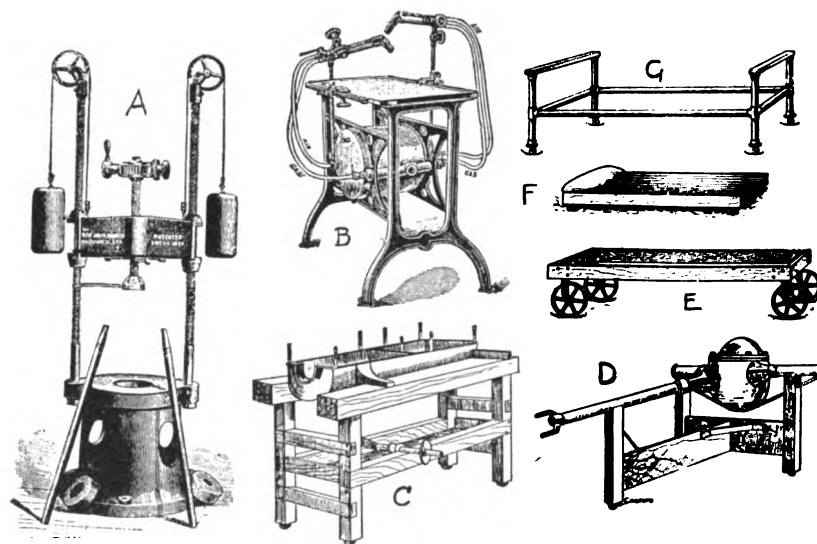


FIG. 6.—A NUMBER OF LABOR-SAVERS THAT THE AUTO REPAIRMAN WILL FIND USEFUL

shop is to be used for automobile work than when it is engaged only on carriage work. A door ten feet wide and ten or eleven feet high will make it possible for practically any motor vehicle or tractor to enter the shop. It will be noticed that a pit is provided. This is a very impor-

machine tool equipment is of the simplest character as it consists only of a lathe, emery wheel grinder and arbor press. The power is furnished by a small gas engine.

At Fig. 3 the floor plans and front and side views of a very practical general repair shop is given. The



building is 46 feet front by 60 feet long. It may be of brick or concrete, or wood may be used. As will be noted, it has a saw-tooth roof. This shop is provided with all the equipment necessary to do blacksmithing, wagon-work and automobile repairing. There is sufficient space for an accessory stock room and office and for a general supply stock room. The machine tool equipment is complete and enough tools are shown to build an automobile, if necessary. There are two doors, one at the front for the automobiles and one at the side for carriages and wagons. Of course, either door may be used for either type of vehicle but by providing a convenient door to the blacksmithing and wood-working section a clear passage is always left for automobiles. It will be noticed that

shops where the lathe would be at one end and the grindstone at the other, so that every time the machinist wanted to sharpen a lathe tool it was necessary to walk the length of the shop and back. Where the arrangement of the tools is poor, one is apt to find confusion everywhere. A neat and orderly layout is a pronounced incentive to the workmen to be systematic and orderly. Also, there should be a place for every tool and appliance and when they are not in use they should always be in their appointed place.

The shop bench should be about 2½ feet wide and 34 to 36 inches high. The legs can be made of iron pipe or castings or of two by four scantling. Two-inch planking is laid across the top to form a foundation for another covering of ¾-in. match-

medium sized pipe vise; large and medium swivel vises; a surface plate; small bench anvil; machinist's clamps; C-clamps, straight edge, surface gauge and some easily handled, compact fire extinguisher. Metal containers should be placed under the bench as receptacles for oily waste and rubbish. Several extension lamps with wooden handle, heavy cord and a steel wire cage should also be provided if the shop lighting is by electricity.

There are a number of pieces of assembling room furniture that will facilitate handling automobile parts. A group of this furniture is shown at Fig. 5. The horse or trestle at A may be easily made by any blacksmith or mechanic, and is not only useful as a support for heavy pieces, but the use of a piece of discarded railroad track as the top rail gives a substantial foundation for riveting, cutting sheet metal, and other operations that will suggest themselves. The portable stand at B, is a stock fixture and is made of cast iron. The advantage of this bench is that it may be brought to the job where considerable assembling work is to be done and it not only provides storage space for parts and tools, but is sufficiently rigid so that chipping, filing, or sawing may be done just as well as on the main shop bench. A wheeled stand is very useful for handling various parts such as change speed gear boxes or engine crank cases when scraping in bearings. A portable work bench that may be wheeled outside of the shop when work is to be done on a car out-of-doors can be easily made by the blacksmith and is very useful. A substantial shelf underneath will hold parts while the ample space on the bench top is for the tools. The bench is easily moved by a pair of barrow handles provided for that purpose. The stand at C is another fixture that can be obtained in the open market. It is made of iron castings and steel tubing and is an ideal stand for use in connection with the forge for holding the blacksmith's tools. It is, of course, equally useful for holding parts when overhauling an automobile. The locked drawer provides storage space for tools while the shelves are excellent to keep parts from cluttering up the floor and becoming lost.

The arbor press shown at Fig. 6-A is a very useful adjunct to any shop equipment because it has sufficient power to force flywheels and gears off shafts, arbors and mandrels in work and for straightening bent



THE MODERN PLANT OF THE R. MCINNIS COMPANY, OF CALIFORNIA

in addition to the double forge equipment, a brazing forge is provided and a bench for doing autogenous welding.

The wood-working machinery may be placed to suit the requirements, though the combination wood-worker, which includes band and circular saws, wood-shaper and planer; all mounted on one substantial base would seem to be an ideal tool where space is at a premium and where a large investment in other tools is called for. It has been necessary in these floor plans to exaggerate the size of the mechanical equipment slightly to make the details clear.

In arranging the departments of a shop, the layout should be for greatest efficiency and convenience. This applies as much to the blacksmith or automobile repair shop as it does to manufacturing plants. Many shops are not profitable because of lack of system and poor general arrangement. The writer has seen some

ed hard wood floorstrips closely fitted together. The average smith shop bench of rough planks with large cracks along the top is not the kind to use for automobile work, because it is difficult to work on the irregular surface and many small but not easily replaced parts may be lost by falling through the openings in the bench top to the floor. A strong shelf should be placed on the wall about two feet above the bench for tools, stock, etc., when not in use and a substantial shelf should be placed under the bench about eighteen inches from the floor to hold the floor to hold the odds and ends that always accumulate in a shop.

A very practical shop bench may be constructed by using cast iron bench legs that may be obtained in the open market. Where the cast iron leg, Fig. 4, is used it is possible to secure a stiff bench without depending on the walls for support. The bench should be provided with a



axles and any other work a press may be called upon to do. The brazing stand, shown at B, is also useful. The average smith does not like to do brazing or babbitt melting in the forge because it spoils his fire and makes it difficult to weld pieces without cleaning out and building an entirely new fire. A brazing stand of this kind is also very useful in connection with an oxy-acetylene welding outfit, as it can be used to advantage for preheating the work. Stands C-D for crank cases, motors and axles can easily be built by the practical smith. They aid materially in handling large parts quickly and easily. A stand made of standard pipe fitting G is useful in handling such parts as front and rear axles, when the wheels are removed, and for frames or bodies. A wheeled truck with a wooden frame and cast-iron wheels may also be used for the same purpose. The "creeper" at F makes it possible for a workman to roll around under a car on a short job where it would not be worth while to get the car over a pit or in shops where a pit is not available.

(To be Continued.)

Carburetor and Ignition Troubles

J. N. BAGLEY.

Bill was one of those fellows who did most of his own repairing when it came to the gas engine and the automobile. He was a handy sort of fellow and usually had good luck with most of it. He was a reader of gas engine journals and said he got a number of good kinks out of them that he profited by. One day Bill came to the shop with a long face and walked around awhile but didn't have much to say. I noticed he was bothered and made inquiry. He told me he was up against it with his car and could not find out what was wrong. I asked him how it acted and he described the trouble to me as well as he could, which was in about this manner: The car runs along pretty well from ten miles up to as fast as he cared to go, but when he tried to throttle it down it would not do anything but miss and skip so badly that it was next to impossible to get it up to speed again. I asked him what he had done for it and was surprised to find he had done most everything and still it acted as it did. In the first place he conceived the idea that something was wrong with the ignition which looks very reasonable. Not being able to discover anything he sent the

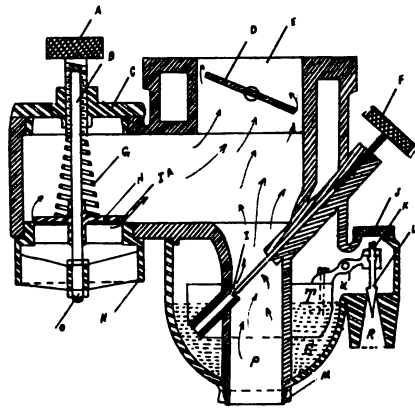
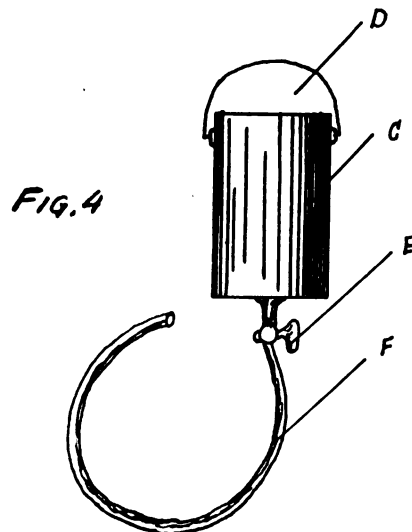
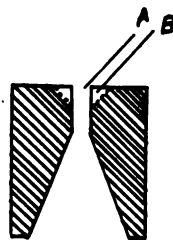
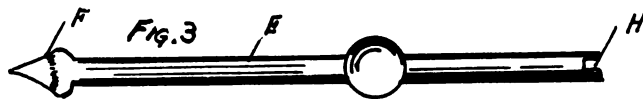


FIG. 1.—A SECTIONAL VIEW OF A TYPICAL CARBURETOR

magneto and coil to the factory and had it looked over. It came back with a bill of \$9.00 and transportation and he put it on thinking all would be well, in fact, he had so much faith that his wife got ready to go to town as soon as he got the coil placed. Well, she waited and would have been waiting yet if Bill had tried to run the car with the coil in the condition it was, for he had the wires tangled up until it could not run had it been O. K. He asked me to look the car over for him and we went out. After having one of those good, old country dinners, that would put a fellow in con-

dition to fix a dozen cars, we set about to find the trouble. After getting the wiring straightened out we started the car and found it still missed at a low speed and would work well at a high speed. We tested the ignition thoroughly and found it in first-class condition. There was no use to look to the plugs because if they would work well at one speed they should work well at all speeds. It seemed that it was either up to the fuel or the valves, as low compression could cause the motor to act in about the described manner. We tested the compression and found each cylinder up to standard so it was necessary to look elsewhere for the trouble. We removed the carburetor and went through it very carefully and could find nothing wrong with it, so we placed it back and tried the motor again, still the same trouble. We stopped the motor and examined everything that could lead to this sort of trouble, such as sticking valves, weak valve springs, etc. During this procedure I got my greasy hands on the exhaust pipe manifold which was just above the intake manifold and when the motor was started the heat began to burn the oil off the pipe. I stood watching the motor run and wondering what could be the trouble when



SEVERAL CARBURETORS HELPS FOR THE PRACTICAL REPAIRMAN



at once I noticed the curl of the smoke from the exhaust pipe that went down along the back side of the intake manifold and was swallowed up or at least, I didn't see any more of it after it went in that direction. I couldn't get my head where I could see behind the pipe but placed my hand behind it and when I did so I noticed the motor began to sound different than it had before. An idea struck me that the trouble was back there somewhere. Bill was at the house so I removed the pipe and found a hole, about an inch in length, which looked much like a defect in molding where a piece had dropped out, letting the air rush in. I shellacked a piece of heavy paper pasted it over the hole and put the manifold back. I then started the motor and after adjusting the carburetor a trifle the motor ran perfectly. Bill came along about this time and began to smile and wanted to know what I did to it. I told him what I found. We tried the car out but there was no more missing. We drove the car to the shop, welded the manifold and the trouble was at an end.

A weak mixture causes a snapping and popping in the carburetor and any one with experience will open the carburetor and give a little more gas and less air. But this same snapping and popping can be caused by defective ignition. That is a partial short in the secondary circuit occasionally firing one of the cylinders with the intake valve in the open position will flash the burning gas back through the carburetor and one cannot tell the sound from that caused by the weak mixture. An over

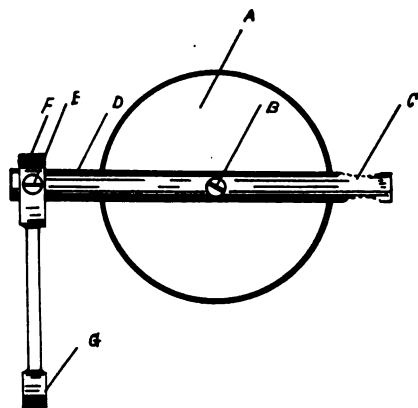


FIG. 5.—EXAMINE THE CARBURETOR FOR WORN PARTS

rich mixture is told by the black smoke that comes from the exhaust. If the smoke is white it indicates an over supply of lubricant in the crank case. Many times after filling the motor with fresh supply of lubri-

cant it will smoke white for a few minutes, but if the supply is not over what it should be it will stop in a very short time.

In Fig. 1, we have a diagram of a carburetor which will show the workings and adjustment. Most carburetors are constructed to work along these lines, while they may differ quite a little in arrangement of parts. No matter what the construction is it must have the spray nozzle I, and the air passages IA, P, must be arranged in some manner about the device. It will be noticed the gas enters through the passage R, to the float chamber S, via needle controle L, which in turn is operated by the float T. When the gas raises to a height sufficient for it to be drawn through the nozzle I the valve L, will be forced into its seat thus stopping the flow through R, to S, until a quantity of the gas is used out, when the float T, will settle, raising needle L sufficiently to allow of the required amount to be replaced in the bowl S. The amount of gas used in the mixture is controlled by the needle adjustment F, which can be screwed either up or down at will of the operator.

The air passage P, is unobstructed with valves or any device to check the flow of air as the air taken into this opening is required to make the correct mixture at low speed. As the motor is increased in speed more air must be taken in as the suction is greater, consequently more gas is drawn from nozzle, I. To meet this demand the second valve is placed at H, which is controled by a spring G, placed over it, bearing directly, and squarely over it. As the suction is increased and more is demanded the valve H, is raised and the air passes under mixing with the mixture already on the way to the combustion space of the motor indicated by the arrows. This flow to the cylinders is controlled by the valve D, which is operated from the lever on the wheel. Air valve H is adjusted by changing the tension on spring G, with knurled nut A, which screw down over stationary guide pin B, and against spring G. The under side of valve H, is coated with a thin disc of leather to prevent air leaking under when valve is closed. Pin B, is held in a stationary position by nut O, and in case this pin becomes worn to such an extent that air will find its way along side through the passage through H, the pin should be replaced as air gaining entrance through this point will interfere with the adjustment. To remove the

entire auxiliary air valve mechanism remove nut C and bottom N. This will permit of repairs or the replacing of new parts in case of wear or breakage. In case the carburetor overflows it may be due to a number

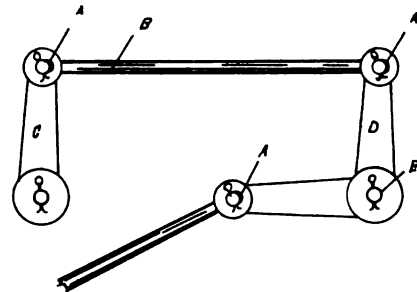


FIG. 6.—DON'T OVERLOOK ANY OF THE MECHANISM

of things. The float T, may be too high allowing the gasoline to raise high enough to run over the top of the bowl, or the float (which is cork) may have lost the coating of shelac and become soaked with gasoline until it sinks, pulling valve L, from its seat and allowing a continual flow from the supply pipe R. In this case it will be necessary to remove nut K, holding valve in place and the pin U holding float arm in place and remove the float. First, all the old shelac should be removed with a fine emery cloth. Then the float should be placed in an oven until all moisture is dried out of it. Now with a small tin of orange shelac at hand and a wire fastened in float arm at U, the float can be dipped into the shelac and hung up to dry. The shelac should not be put on with a brush as it has a tendency to be uneven, and beside it will not go into the porous places so well as when dipped. Many times the seat in casting R becomes worn to such an extent that the surface is so wide the valve will not stop the gas. In this instance the bowl should be removed from the carburetor by unscrewing nut M from main frame of the carburetor. Remove the knurled nut J, and remove nut K lifting valve L from the float arm. Remove the float as already described and proceed with a tool as shown in Fig. 2. This tool is made up of a piece of steel as follows: Take a piece of drill rod, or tool steel about $\frac{3}{8}$ inch in diameter and drill a hole in one end as shown at C, for a pin to be inserted the same size that will make a working fit in the seat as shown in Fig. 1 at R. Cut teeth and file to edge as shown at D, and after hardening place pin C in the hole B. Now by revolving the tool in the seat the



edge or seat will be made perfectly square and true.

In Fig. 3, is shown a somewhat exaggerated float valve with seat F, worn quite badly. As the body E, and the end F, are one piece it will be necessary to place the valve in a lathe and with a jewellers file true the pin to a perfect taper. After doing this, cut a notch with the hack saw as shown at H, which will permit of a small screw driver being used in order to grind it to place when it is in position.

Fig. 4 at A, shows the seat as it should be after tool A, in Fig. 2, has been used. At B, Fig. 4, is shown a somewhat exaggerated worn seat. The seat should be very thin and square as the less surface at this point the easier it will be to keep the valve gas tight. Now place the assembly as it was before taking down and with a light screw driver touch the stem lightly and turn it around a couple of times.

To test the carbureter for leaks use a device as shown at C, in Fig. 4. This consists of a can or small pail with a bail D for hanging, and a cock E, for shutting the flow, with a sufficient length of hose F. Attach the hose F to the carbureter and open the cock E with the bucket well above the carbureter and allow the gas to fill the carbureter. If the carbureter leaks place the screw driver in the notch H, in Fig. 3, and turn it a few times using very little pressure, and if the leak is coming from this point it will be stopped. In case it comes from the nut at the bottom of the carbureter remove the nut and bowl and place a washer made of thin sheet lead and place the nut, tightening it tight. Do not use any save lead or cork as other gasket material such as rubber or leather will be dissolved by the gasoline.

At this time it is a good plan to look the carbureter over for other worn or defective parts. In Fig. 5 at C, is a bearing of the throttle valve which becomes worn from constant use and should be replaced. Many times the screw, B, becomes loose and allows valve, A, to be loose and the throttling of the motor cannot be controlled. The points, D, C, should be perfectly tight. While control arm, F, should be held firmly by screw E, for in case it was loose at this point the motor would not be sensitive at the throttle. The hole for control rod at G, should be examined and if not found round and true, should be drilled out and a larger rod place instead or the

hole bushed and the hole drilled to fit the old rod.

In Fig. 6, we have a diagram of little parts quite often overlooked in overhauling, and these little things have more bearing on a smooth running motor than one would think. At the two arms, C, D, we have five small bearings as shown. We have excessive wear at points, A, E, which will amount to enough to cause a motor to run very irregular. To overcome this in the most economical way the worn holes should be reamed out large enough to make



A SET OF MINATURE TOOLS MADE BY MR. CLEM STRIBLING, OF TEXAS. THE SIZE MAY BE JUDGED FROM THE SPOOL, UPON WHICH THE ANVIL IS SETTING, WHICH IS FOR THREAD NO. 60

them perfectly round and true and rod, B, substituted with a new and larger one to fit the holes. Before placing the small cotter keys it is a good plan to slip over the rod end a small washer, thick enough to eliminate all side play of rod, B. A very good plan where possible is to eliminate the use of the little joints and arms as described and use a small chain, or cable, the tension being kept tight by the aid of a spring. In this make up there will be no lost motion by wear, for it will be taken up by the spring.

Water in the gasoline will cause the motor to act many times as though the mixture is weak, but this can be overcome in a few seconds by opening the drain cock and allowing the mixture in the bowl to run out. If there is no cock on the carbureter to allow of it being drained the nut at the bottom can be loosened enough to permit of the gas

flowing past the gasket, but before loosening the nut the gasoline should be shut off from the tank.

A stoppage, or a partial stoppage in the gasoline tank line, will many times bring out symptoms that will indicate carbureter trouble as well as ignition trouble. I remember quite well on one occasion taking a car out to find a trouble the customer had had for some time and after driving a half mile or so the car slowed down and stopped as though it had ceased firing. I got out and examined the ignition, etc., and all seemed to be well and cranked the motor and it went off with a snap as though nothing had ever happened. After driving about a mile it did the same thing again and after looking it over cranked it up and the same action was repeated. It had done this a number of times and I could not find the cause until the next time it stopped. I at once got under the car and disconnected the gasoline line leading from the tank and found it only dripped. I removed the strainer and could find nothing and after fishing around the inside of the tank a small piece of rubber was brought to sight, which had been causing all the trouble. The rubber had come from the inside lining of the hose at a gasoline pumping station and would occasionally drift over the opening and stop the flow. When the car was stopped for a few minutes enough of the gasoline would get under to start the car and the shaking of the car from the motor running would shake it from the opening and all would be well for a mile or even a number of miles. All gaskets and joints about the gasoline should be soaped before screwing up the nuts, as soap will not be effected by the gasoline.

Another Opportunity for the Vehicle Worker

Owners and operators of automobiles are beginning to wake up to the added possible use of their machines, particularly where the machine is used in a commercial and business way. They are beginning to realize that they can carry or draw two and three times as large a load. This has come about through the agency of the auto trailer. And here again is an opportunity for the vehicle smith and general repairman.

The trailer, comparatively new, is being tried out in practically all lines of business. The Post Office Department, as well as the Army Division of the United States



Government are trying it out and the tests made have been very gratifying. It is, of course, impossible to draw a heavily loaded trailer with an expenditure of power the same as if the automobile were run alone, but the extra power and fuel required is so very little more that the extra cost compared with the hauling capacity is almost unbelievable.

Not very long ago a progressive general smith, located in a middle western state and operating quite a large general shop, made a small trailer which he could hitch behind his Ford runabout to carry a kit of tools which he was required to carry with him to the various jobs which he was called upon to do from time to time at outlying farms. After receiving some half dozen or more offers for the purchase of the trailer, he finally woke up to the fact that there was a market for just such a vehicle. He has since built a number of them and is selling all he has time to build.

There is no reason whatever, why the general smith who is advantageously located, cannot build and sell a number of these trailers every season or if he has not the facilities in his own shop, there are a number of large manufacturers for whom he can act as agent and make a neat profit with very little shop or selling expense. If the smith himself has an auto, he can easily demonstrate the many practical features of the trailer similarly to the smith spoken of and he will find orders virtually pouring in upon him with very little effort on his part.

The uses to which the farmer can put the trailer are practically without limit. The hauling of a load of produce to town becomes an extremely simple matter with the trailer. And with the increasing demand and sale of the pleasure automobile, there will be a continued increase in the demand and sale of trailers. There is no reason whatever why the general blacksmith should allow someone else to get all of this business. He can sell the trailer just as easily and just as well as any other merchant and when it comes to repairing, he is of course the logical man for this work.

Those smiths who have argued against the general smith taking up automobile work cannot apply the same arguments when considering the trailer. For these men, the trailer becomes the connecting link between the general smith, who has confined himself exclusively to the

horse-drawn vehicle, and the automobile and motor truck.

To get an idea of what you can do in your locality with the trailer, ask your auto-owning customers if a trailer would be of practical help and financial worth to them. And to test out the trailer in practical ways for the doubting ones, why would it not be very practical to fit up an ordinary farm wagon so that it could be drawn by an automobile?

Carbon Burning

Profitable Work for the Blacksmith—A Process of Removing Carbon from Automobile Cylinders Which is Simple and Practical, Yet Often Misunderstood

M. KEITH DUNHAM

(Oxy-Acetylene Engineer.)

A profitable adjunct to the oxy-acetylene apparatus is the carbon burner. Not only does its use return to the blacksmith an unusual profit,



ANOTHER OPPORTUNITY FOR THE GENERAL SMITH

but it brings the automobilist to the shop equipped to do this work and very naturally other than carbon burning is also secured.

The process is one of the simplest, if the principles are understood; yet, perhaps, because of its very simplicity, it is often misunderstood, the work improperly done and the process condemned as impractical.

Considerable space has been devoted to it in trade and technical publications, its merits have been discussed pro and con, warnings given of oxidation of the metal, danger of cracking the cylinder by the intense heat, etc., until the average reader is bewildered by the mass of technical details thrust upon him. To understand all about carbon burning and its really wonderful qualities does not require any technical discussion—it merely requires that attribute which the blacksmith must possess, plain every-day judgment or "horse sense."

What Causes Carbon?

Carbon in the motor is caused by

imperfect combustion. The driver of an automobile will say he used too much oil, that the carburetor was adjusted wrong, that the piston was too loose. All or any of these reasons may be correct but the real reason why the carbon is there is because there wasn't enough air present to completely burn the fuel. In other words, combustion was not complete and the carbon or soot deposits itself on the top of the piston, around the valve chambers and in the top of the cylinder itself.

When we see black smoke coming out of the chimney or examine the old kitchen stove when it doesn't "draw" well and find it clogged with soot, we have very good examples of imperfect combustion, that is, the fuel has not had enough air to completely burn it and the carbon, which is an excellent fuel, has not been burnt up because it has not received enough air.

Air, then, is necessary to burn anything and the element in the air which supports combustion is the oxygen, one-fifth of the atmosphere being this element and the other four-fifths nitrogen, which is a diluent. To remove the carbon from a motor then requires the necessary amount of oxygen to consume or burn it. And since the owner of an oxy-acetylene apparatus has a supply of practically pure oxygen at hand, it becomes a simple matter to remove the carbon by burning it, since any fuel will burn much faster with pure oxygen than it will with air, which is only one-fifth oxygen.

The blacksmith should note here that oxygen alone is necessary to remove carbon—no acetylene being required. The carbon is the fuel and the oxygen burns it up. In the welding torch, the acetylene is the fuel and the oxygen burns it—therefore, to use the oxy-acetylene flame to burn carbon out of a cylinder, aside from the fact that the intense heat would crack the cylinder, would be impractical, since such a flame would merely heat the carbon and not destroy it. It is on this point that most of the so-called learned discussions hinge,—that the oxy-acetylene flame will oxidize the metal or crack the cylinders and so it would but the oxy-acetylene flame is not used and, therefore, the metal is not oxidized nor the cylinder cracked.

Every blacksmith knows that when he wants a more intense fire, he starts the blower or uses the bellows, as the case may be, and immediately the coal begins to burn at a faster rate, because it is receiving



more oxygen. Shut off the air and the fire immediately dies down.

Carbon burning is exactly the same principle—the carbon in the cylinder taking the place of the coal and oxygen used in place of air.

Apparatus Required

Many of the acetylene welding apparatus manufacturers include a carbon burning torch with the equipment. The requirements are very simple, a copper tubing and a handle to conveniently grasp being the main considerations. On some there is a spring shut off valve, on others an ordinary petcock and many are made without shut off valves.

If no carbon burning torch is easily obtainable, one may be made by taking a piece of annealed copper tubing, eight or ten inches long, and about one-eighth inch inside diameter and soldering it to a welding tip,—a burned or useless one will do. The tip may then be screwed into the torch, remembering that no acetylene is used, however, but merely the oxygen alone.

The balance of the equipment consists of the oxygen cylinder with a suitable diaphragm regulator and a short length of hose.

How to Operate the Equipment

With the motor of the automobile running, shut off the gasoline between the carburetor and the tank, allowing the motor to stop from lack of fuel. Now take out the spark plugs from each cylinder. Crank the motor until the piston is at the top of the cylinder to be cleaned. If one is experienced with motors, this may be determined by the position of the valve springs; if inexperienced, a piece of wire may be put through the petcock (if the cylinder has one) or bent and inserted through the spark plug opening and the position of the piston determined by "feeling" the rise and fall of the piston as the motor is cranked. On those cars equipped with self starters and with the crank missing, the piston will have to be brought to the top by moving the flywheel. The chief thing to remember is to have the piston at the top of each cylinder before starting to burn.

If care is used, there isn't any particular fire hazard, yet it is advisable to have a bucket of sand convenient or one of the modern fire extinguishers, particularly where the motor has been neglected and there is considerable oil and grease which may be easily ignited by small sparks.

The proper oxygen pressure to use will vary with the condition of the

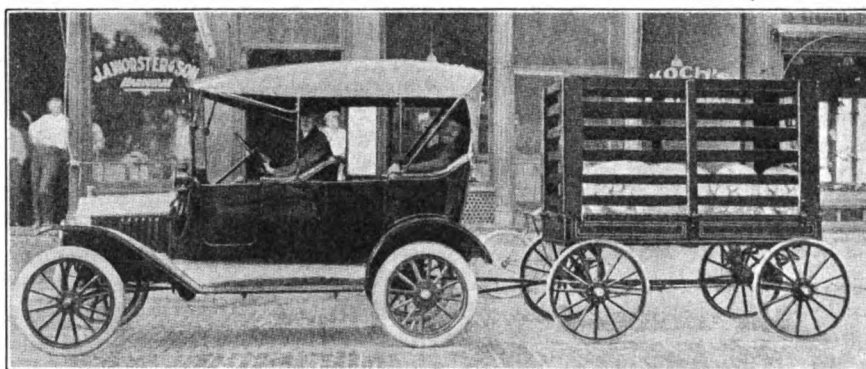
cylinder and the size of the copper tubing used on the burner. The pressure should be held as low as possible—fifteen pounds should at all times be ample and if the cylinder is badly carbonized and oily—that is, if there is plenty of fuel present—the pressure should be much lower than this at the start, say three or four pounds. The condition of the cylinder can be determined somewhat by the appearance of the spark plug. If the carbon on the plug is very dry a better job can be done by squirting into the cylinder about a teaspoonful of oil,—kerosene, light cylinder oil or even alcohol. Care should be exercised to distribute this oil over as great an area as possible. The object of it is simply to provide more fuel—to make the burning easier.

The use of oil should not be resorted to except in cylinders which are

around and about, the idea being to come into general contact with all parts of the compression chamber.

At the start there will be a flame, the size depending upon how oily the cylinder is and how much pressure there may be on the oxygen. Hold the pressure down until this flame dies down to a very small one, then increase the pressure on the regulator—(or by opening full the cock on the carbon burner if the pressure on the regulator has been previously set) to twelve or fifteen pounds. When sparks stop issuing the cylinder should be free from carbon.

Beware of a high pressure at the start. Remember that if there is plenty of fuel present—if the cylinder is particularly dirty—and a high pressure of oxygen is given, that fuel is going to burn very fast. This means considerable heat and it is just possible that a valve may be



HAULING A LOAD OF FARM PRODUCT TO TOWN IS A SIMPLE MATTER WITH THE TRAILER

very dry. It is a fact that the dirtier the cylinder—the more carbon that is present—the easier it is to clean. This is easy to understand since since there is more fuel to burn and combustion is more perfect than where there is but little carbon present and the fire likely to go out owing to lack of fuel. Sometimes carbon deposits itself in spots and in this case we must also use a little oil to connect these spots so the fire will not go out before all the carbon is burned, as it would if we did not put in more fuel, that is, the oil.

We can start the fire with a lighted match dropped down through the spark plug opening, though it is a little more convenient to use a wax taper. Then we insert the copper nozzle through the opening directly on the flame of the match or taper and the carbon starts burning. The nozzle should not be held at this point but it should be pushed into the cylinder, forward and back,

warped or possibly a piston or cylinder cracked. This could only happen, however, if no attention is paid to the presence of a big flame and a high oxygen pressure.

Some manufacturers advise taking out the valve cap to insert the copper tube—it will be noted that we have advised the removal of the spark plug. There are real reasons for this advice, based upon considerable practical experience but they are too long to give here. Sufficient in this article to state that the opening through which the copper tubing is put should be as small as possible—not as large as possible, as is the case when the valve cap is removed.

Finishing Up

After all the cylinders have been cleaned, some users remove the valve caps and swab out the top of the piston and valve tops and chambers with an oily rag. This may or may not be advisable—it depends a good deal upon the wishes of the customer.



The spark plugs should be cleaned with gasoline before putting back, then the cylinders primed and the motor started.

Cost and Charge

The amount of oxygen consumed will vary with the size of the cylinder, the amount of carbon present and the knowledge of the user. The average consumption is from three to four cubic feet of oxygen per cylinder. If the gas costs at your shop, say three cents per foot, about twelve cents per cylinder should cover cost of gas. The time taken to do one cylinder, including burning, finishing, starting the motor, etc., will average about ten to fifteen minutes.

When the process was first introduced, most users made a flat charge of one dollar per cylinder. This has been reduced in most sections, however, and a fair charge on most motors would be fifty cents, or two dollars for a four-cylinder car. The price to be charged for this work is a matter of personal judgment. The blacksmith might make a leader on Fords, say and charge only one dollar, bringing business of another nature to his shop and yet making a fair profit on his carbon burning.

The driver of a car often mistakes the presence of carbon for other ills. He thinks the connecting rods are loose, the bearings gone, etc. It's a pretty good business getting plan to offer to burn the carbon out and let the driver be the judge of whether the process is worth the price he is charged. The improvement in the car is usually so marvelous that there is no hesitancy over paying the bill.

Horseshoeing Shops on Wheels

New York City Has Portable Shoeing Shops

There are six blacksmith shops on wheels in the New York fire department, three in Manhattan and three in Brooklyn, each equipped with forge and anvil, hammers and horse-shoes, according to the New York World. Charles Maloney and David Phillips man one of these traveling shops. They have a busy time during the sharpening season. Fire horses have to have sharp shoes.

When the wagon draws up at an engine house in answer to a call, the horses are unhitched and unharnessed and sent in to the engine. There they stand ready to go out on the first call, while the regular horses are in the horseshoer's care.

The boss of the wagon starts his forge and shapes up the horseshoes, while the helper does the fitting. In a rush, the shoe being ready, Phillips can put a shoe on in four minutes. The average work of the horseshoer team is five horses, or twenty shoes a day. To do this work requires trips to different houses and the warming up of the forge.

Fire horses are almost always fitted with shoes inside the engine house. To lead a fire horse outside and undertake to shoe him wouldn't be so bad were it not that a fire call might come in. Then there would be no chance. The horse would want to go to the fire.

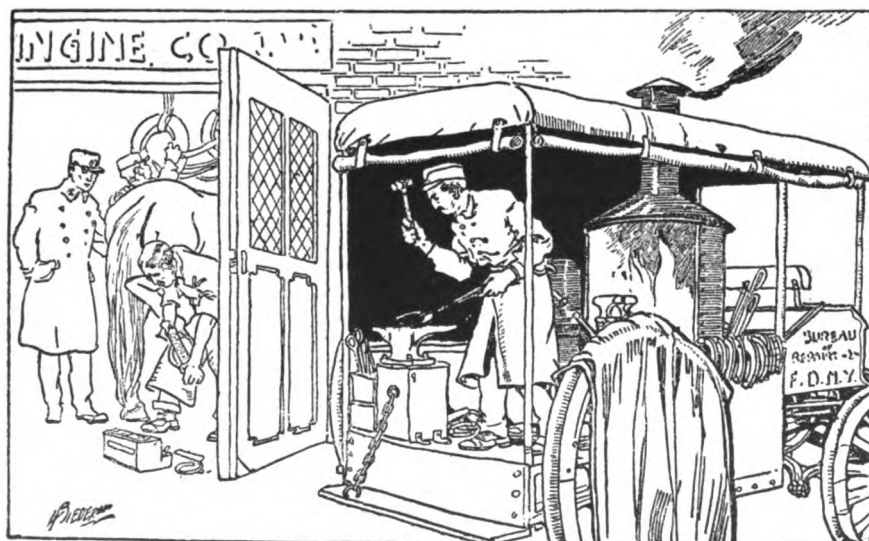
It is impossible to shoe a horse while he is on a fire call. Maloney says he almost had to do it once, but failed dismally. At night the travel-

ing forge doesn't go out. The horseshoing reserves answer calls with their tool bags.



Longevity in the Trotting Horse—The 2:10 Performers

The wearing qualities of the American trotting bred horse, which enable a large proportion of the horses of that breed to reach a more advanced age than marks the horses of other breeds is not hard to understand when one looks up the ages of the foundation sires and notes how longevity seems to have been transmitted along with other qualities. The Hambletonian family presents a striking example of the transmission of the qualities which make for a long life. Hambletonian, as most persons at all familiar with the history of the trotter, are aware, is a descendant of imported Messenger, three removes away. Messenger lived to be 28 years old. His son Mambimo lived to be 25. Abdallah, the son of Mambimo, that sired Hambletonian, lived to be 31 and Hambletonian, himself lived to be 27. It would take a lot of investigation to secure correct data as to the age all of Hambletonian's sons and daughters lived to attain. Of his sons that became sires of speed, however, it is comparatively easy to secure information in this respect and the figures show that no less than 19 of his speed siring sons lived to be more than 25 years old, 13 of the number reaching the very advanced age of 29 years or older. Among these aged sons of Hambletonian are George Wilkes, 2:22, the greatest son of his sire and Dictator, Harold and Volunteer, each sire of a world's champion trotter. The full list of these sons of Hambletonian that lived to be more than 25 years old is: 34 years old—Volunteer; 31 years old—Middletown; 30 years old—Artemas, Dictator and Jay Gould. 29 years old—Alministrator, Ajax, Aladdin, Chester Chief, Dantless, Harold and Idol, Stephen A. Douglas and Strathmore; 27 years old—Echo; 26 years old—Aberdeen, Cuyler and George Wilkes. Among the get of nearly all of these sons of Hambletonian are examples of similarly advanced age, but the George Wilkes family presents by far the most uniform transmission of the qualities that more for old age. There are 25 of the speed siring sons of George Wilkes that lived to be more than 25 years old, as follows: 33 years old—Favorite Wilkes; 32 years old—Harry Wilkes; 31 years old—Baron Wilkes; 30 years old—Alcantara, Ira Wilkes, Red Wilkes and Woodford Wilkes; 29 years old—Gambetta Wilkes and



—From New York World.

THE HORSES THAT DRAW THE FORGE ACT AS FIRE HORSES WHILE THE FIRE HORSES ARE BEING SHOD



General Wilkes; 28 years old—Ambassador, Jay Bird, Kentucky Wilkes, Patchen Wilkes, The King and Young Jim; 27 years old—Ellerslie Wilkes, Hambletonian Wilkes, Jersey Wilkes, Onward and Tennessee Wilkes; 26 years old—Allie Wilkes, Brown Wilkes and Sentinel Wilkes. In the next generation from George Wilkes, many of which are still alive the following speed producing sires, now dead lived beyond 25 years: 32 years—Ashland Wilkes, by Red Wilkes; 31 years—Eagle Bird, by Jay Bird; 29 years—Allie Wilkes, by Red Wilkes and Jim Wilkes, by Young Jim; 28 years—Anderson Wilkes, by Onward, Argot Wilkes, by Tennessee, Wilkes and Glineva Wilkes, by Alcantara; 27 years—Domineer, by Red Wilkes; Game Onward, by Onward and Jackdaw, by Jay Bird; 26 years—Billy Wilkes, by Harry Wilkes, Bobby Burns, by General Wilkes and Gamaleon, by Gambetta Wilkes.

The old-fashioned family of Morgans, the blood of which is to be found in some degree in a large number of our modern trotters has probably had considerable influence in adding to the longevity of the trotter, as a breed. Old Justin Morgan, the founder of the Morgan family, himself lived to be 28 years old. His son Sherman Morgan, through whom came his greatest line, was 27 years old when he died. Vermont Black Hank, Sherman Morgan's most noted son lived to be 23 and his son Ethan Allen, 2:25½, that was the world's champion trotting stallion in 1858, was 27 when he died. Ethan Allen's greatest son, Daniel Lambert lived to be 31 and one of his best sons, Aristos, 2:27½, was 25 at the time of his death. Another noted son of Vermont Black Hank, Flying Cloud, lived to be 30 and his most famous son was Star of The West, 2:26½, that was 31 when he died. Bulrush Morgan, another son of Justin Morgan was 30 and he sired Sherman Morgan, that lived 27 years. Still another of old Justin's sons, Woodbury Morgan, that died at 22, was the sire of Gifford Morgan that was 26 and he, in turn, sired Green Mountain Morgan that lived to be 31. Other noted Morgan sires that lived to be very old were: Gen. Knox, 32; Magna Charta and Royal Feaught, 31 each and Walker Morrill and Honest Allen, 25 each. The Morgan family gives an example of the largest number of undertaken generations of old age sires as follows: Poem, 27 years, by General Washington; 26 years, by General Knox; 32 years, by Vermont Hero; 25 years, by Sherman Black Hank; 25 years, by Vermont Black Hank; 23 years, by Sherman Morgan; 27 years, by Justin Morgan; 28 years, eight generations, covering a period of more than 100 years with only one horse dying as young as 23 years.

The Clay family, that played a great part in the founding of the trotting breed, furnished some examples of advanced age in the speed sires descended from the head of that family as follows: Harry Clay, 34; Cassins M. Clay, Jr. and Clay Pilot, 30; General Hatch and George M. Patchen, Jr., 28; C. M. Clay, Jr. and Seneca Patchen, 27; Sam Purdy, 25, and American Clay, 34. Some of the other less prominent foundation families contributed to the old-age proclivities of the trotter. For instance, there was Royal George that lived to be 20 and that sired Toronto Chief that was 20 when he died, his son Thomas Jefferson living to be 28. Then there was Norman (Alexander's) that sired Sirgent, 27 and Blackwodo, 25. The two Champions, Gooding's and Scobey's,

lived to be 30 and 26 respectively. Columbus, the horse of unknown breeding whose blood was found in several of the good performers of 25 years ago, lived to be 29 and he sired Phil Sheridan that was 34 when he died.

George Wilkes was not the only one of the long-lived sons of Hambletonian that was marked by long-lived descendants. For instance, Electioneer, that died at 22, sired Anterolo, 31; Anteros, 28; Norval, 27; Chimes and Eros, 26; May King, 25 and Sphinx, 24. Old-age sons of Harold and their ages are: McCurdy's Hambletonian, 25; Attorney, 24 and Lord Russell, 24; of Strathmore: Sternway, 28 (sire of Strath-



ERNEST OWENS AND GEORGE W. CARTER, OF ILLINOIS, BOTH SHOEING THE SAME HORSE. "BUT SOMETIMES IT TAKES THREE TO NAIL ON ONE SHOE" SAYS CARTER

way, 27), Santa Claus, 23 (sire of Sidney, 27); of Dictator: Director, 27; of Volunteer: Louis Napoleon, 28 (sire of Jerome Eddy, 29), Hamlet, 21; of Happy Medium: Riley Medium, 29.

It is no wonder, in the light of the figures showing the extreme old age which so many of the leading trotting sires have reached, that the American trotter is today the longest lived, most enduring breed of horses in the world and one cannot escape the conclusion that this is due, in a great degree to the system of racing which has featured the trotting turf a system that develops stamina and game-ness which the modern method of short dash racing in vogue on the running turf does not require and which has resulted in the average life of the thorough-bred becoming shorter instead of longer.

So rapidly has been the increase in extreme speed among the trotter and pacers that last season no less than 63 stallions were added to the list of sires represented by one or more 2:10 record performers. It was not so many years ago that the entire list of 2:10 sires was no larger than the list of those which became 2:10 sires in 1915. The stallions which joined the list of 2:10 sires last season, the year each was foaled, sire of each and number of 2:10 performers by each that entered the 2:10 list are as follows:

Locanda, p., 2:02, (1897) by Allerton, 2:09; one.
The Eel, p., 2:02½, (1902) by Gambolier, p., 2:22½; one.
Don Densmore, p., 2:02½, (1906) by Pactoens, 2:12½; one.
C. The Limit, p., 2:03½, (1904) by Searchlight A, p., 2:03½; one.

Allanwood, p., 2:04¼, (1899) by Knott Allan, p., 2:13¼; one.
Colorado E., 2:04¼, (1907) by The Bondsman; two.
Charley Hayt, p., 2:06¼, (1894) by Allerton, 2:09¼; two.
Wiltranby, p., 2:06¾, (1892) by Jim Wilson; one.
Dan Logan, p., 2:07½, (1905) by Charles Derby, 2:20; one.
E. M. R., p., 2:07¼, (1897) by Myron McHenry, 2:15½; one.
San Francisco, 2:07¾, (1903) by Zombro, 2:11; four.
George Leavitt Todd, 2:07¾, (1907) by Todd, 2:14¾; one.
J. Malcoln Forbes, 2:08, (1907) by Bingen, 2:06¼; two.
Jim Todd, 2:08¾, (1907) by Todd, 2:14¾; one.
Baron McKinney, 2:10¼, (1904) by McKinney, 2:11¼; one.
The Native, 2:10½, (1904) by Moko; one.
Henry Selzer, 2:10¾, (1905) by Todd, 2:14¾; one.
Wild Nutling, p., 2:11¼, (1893) by Wildnut; one.
Nuko, 2:11½, (1905) by Mobel, 2:10¾; one.
Border Knight, 2:12¼, (1903) by Bingen, 2:06¼; one.
Vernon, p., 2:15, (1889) by Artillery, 2:21½; one.
Don Cole, 2:15¼, (1891) by Dictator; one.
Lewis Wilkes, 2:15½, (1895) by Hinder Wilkes, 2:20¼; one.
Actonward, p., 2:15¾, (1893) by Shadeland Onward, 2:18½; one.
Parole, 2:16, (1889) by Patron, 2:14¾; one.
McLintock, 2:16¼, (1902) by Grattan Boy, 2:08; one.
Bert Logan, p., 2:16½, (1900) by Colbert, 2:07½; one.
McBeth, p., 2:17¼, (1899) by Geronemo; one.
Como, p., 2:17¼, (1888) by Sphinx, 2:20¼; one.
Binjolla, 2:17¾, (1901) by Bingen, 2:06¼; two.
Baron H., 2:19, (1892) by Baron Wilkes, 2:18; one.
King Bingen, p., 2:19¾, (1903) by Bingen, 2:06¼; one.
Texas Jack, p., 2:19¾, (1880) by Judge Durrell; one.
The Captain, 2:20¼, (1901) by Bingen, 2:06¼; one.
Dale Patchen, p., 2:20½, (1895) by Bourbon Patchen, p., 2:09; one.
Ben Corbitt, 2:21, (1888) by William Corbitt; one.
Alverton, 2:21¼, (1899) by Allerton, 2:09¾; one.
Devil Hal, p., 2:22¼, (1905) by Direct Hal, p., 2:04¼; one.
Go Ahead, p., 2:22¼, (1890) by Eros; one.
Bob Noble, 2:24¼, (1905) by Silent Brook, 2:16½; one.
Bon McKinney, 2:24¼, (1908) by Bon Voyage, 2:08; one.
Directwell, 2:24¼, (1899) by Direct, p., 2:05½; one.
Seneca Stewart, 2:24¼, (1900) by Stewart, 2:25; one.
Hal Burk, p., 2:24¼, (1892) by Prince Hal, p., 2:12¼; one.
Leo Muscovite, 2:29½, (1902) by Muscovite, 2:18; one.
Boumont, by Del North, p., 2:08; one.
Captain H, breeding and age unknown; one.
Colonel Mason, (1899) by Major Mason, p., 2:09¼; one.
Dictatus Medium, (1897) by Dictatus, p., 2:17; one.



Preparedness

(With Apologies to Orlo L. Dobson.)

Reading, writing every day;
Thinking, mapping out a way,
Down to "brass tacks" and details
How to boost my season's sales.
Scanning closely everything.
Busy with my plans for spring.

Pushing winter goods and stock,
Striving to out do the clock.
Talking new work with a will,
Striving to collect each bill.
Studying price on everything;
Busy with my plans for spring.

Hustling work out with a vim,
While we're getting shop in trim;
Getting trade that comes my way,
Watching prospects every day.
Soon we'll make the welkin ring;
Busy with my plans for spring.

Studying new catalogs,
Posting up on cattle, hogs;
Looking over crop reports,
Talking speed carts with the sports.
Meantime cheerily I sing;
Busy with my plans for spring.

Stocking up in every line,
Making the old warehouse shine;
Getting up a line of talk,
Which will flow without a balk
When my front door wide I swing,
As the robins herald spring.



Heats, Sparks, Welds

The hen is the only one that can earn a living by sitting still—so it's up to man to hustle.

What your competitor says is not so likely to harm you as what you do about what he says.

Prospects may be bright, but did you ever hear of them being so bright that they hurt a man's eyesight?

The best smith on earth won't amount to much unless folks know about him. Advertise, let folks know what you can do.

Would you be satisfied if—you were selling your work, services and goods to yourself? Ever think of business that way?

"An optimist is a fellow who makes lemonade of the lemons he has handed

to him," says an exchange. Are you an optimist?

Are you really selling service with your services? Service often spells the difference between satisfaction and dissatisfaction.

Spring cleaned yet? It's getting late; better do it now before the neighbors mistake it for mid-summer cleaning or fall cleaning.

There are very few smiths who do not know that their business methods need a change, but they are either too lazy or haven't the nerve to go ahead with the change.

It is not the customers you get who count most. Keeping them is the main point. Careful attention and persistent attention to the keeping of them will make the getting much easier.

Why not white-wash the interior of the shop these days? The real cheerfulness and brightness produced by the thin coating of white is all out of proportion to the little work and expense necessary.

The oxy-acetylene cutting torch has found its way into the armies of the fighting nations. It is used very effectively in the cutting of bridge supports where it is desired to hamper the enemy

The life of a British army officer, it is said, averages but twenty-three days after he reaches the firing line, while a horse averages but ten days of actual fighting time and an automobile a month.

Bank-ruptcy or bank-account—which, in which direction are you headed? It's up to you. If craft conditions, as you find them are not what they should be, make them so and then you'll be most likely to get what you want.

"He doesn't read 'Our Journal' and that's why he's not stuck on his job and still gets stuck on so many jobs"—said one of "Our Folks" in trying to explain Tom Tardy's failure to connect with success. How do you explain it?

A new engine that operates on gas and steam has been recently brought out. It combines the steam engine and the gas engine and will operate on any fuel, the real power impulse being given to the motor by the expanding gas and steam. It is suited for auto, marine and stationary uses.

Are you ready to grasp opportunity when it comes your way? How about the automobile opportunity that is with you right now. If your business has been affected by the automobile and motor vehicle, why not grab hold of the very thing that has caused the decline, however slight it may be, in your business.

You cannot call upon your neighboring brother smith during rush hours, but there is no reason why you cannot make an occasional call when business is not so brisk. You will both be gainers by becoming acquainted, and then, too, don't forget that a copy of THE AMERICAN BLACKSMITH will back up your greeting of friendliness and good will.

On "Easy Street" would your business be if you never lost a customer once gain-

ed. Study to hold them as long as you are in business, follow them up when they stray. Get to the bottom of any possible dissatisfaction and square up the little misunderstandings that arise. Careful, patient coddling is worth all it costs—you are paid in more business and more prospects—more profits.

A dollar will do a lot of good if used in right way. For instance: for one of Uncle Sam's greenbacks, you can have THE AMERICAN BLACKSMITH sent to anyone who may reside within the boundaries of the United States—get six months' credit on your own account and bring the brightest kind of a smile to our face. This is working Uncle Sam's little dollar pretty hard, but, why not try it?

Did you ever sit back and compare the craft of today with that of your grand father's days? Look back and see what your grandad had to work with—the tools—the stock—the machines. Then consider the advantages you have today,—the labor-saving devices—the time-saving tools—the temper-saving material. And yet you've got to know more to be a real, live, up-to-date worker and, working right, can make more money. Just sit back and think it over.

If it were possible to operate upon your business and cut out the unnecessary, unprofitable, how much would there be left? Try this little operation on your business. Consider seriously the unprofitable work that you are doing. See if your net profits cannot be boosted considerably by cutting out the unprofitable work and while you are at it, do a little cutting on the expense end of the business. Remember that each cent of decrease in expense adds two cents of profit at the end of the year.

Some folks and some of them are smiths, look upon the automobile as something which is temporarily relieving the horse of some of the hard work. They seem to think that it will be only a short time before the horse again will be supreme as a puller of carriage, wagon and truck. There will, of course, be horses for some time to come, but after the small farm tractor is developed and after the motor vehicle is lowered in cost, the horse will decrease in use. Nothing is to be gained by the smith in an attempt to stand in the way of progress. It is impossible to argue against the facts which are presented to us every day. The modern, up-to-date smith will grasp the automobile opportunity instead of attempting to argue against it and run the risk of being crushed by the steam roller of modern progress.

One tractor sold to a farmer was operated by his sons. Both of them were interested in machinery, and had a regular machine shop of tools. Several times the service man was called back to correct trouble, and the father began to lose confidence in the machine.

"If you take all the boys' tools away and limit them to an oil can and a piece of waste," said the service man, "it will run without trouble."

Tractors are like automobiles in that they always run better in the cool night air because, in the dark, it is not possible for the operator to do so much tinkering as in the daytime.

—The Country Gentleman.



Our Honor Roll

142 NEW NAMES THIS MONTH

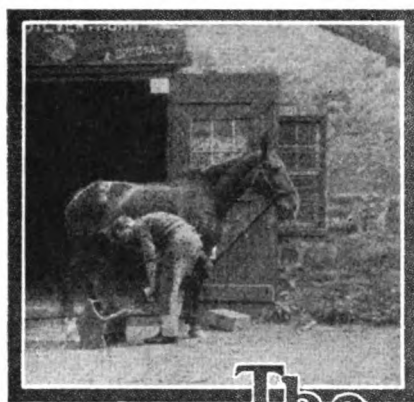
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2 yrs.	\$1.60 save \$.40	2.00 save \$.50	10 sh. save 2 sh.		
3 yrs.	2.00 save 1.00	2.70 save 1.05	14 sh. save 4 sh.		
4 yrs.	2.50 save 1.50	3.20 save 1.80	18 sh. save 6 sh.		
5 yrs.	3.00 save 2.00	3.75 save 2.50	1 £ save 10 sh.		
10 yrs.	5.00 save 5.00	7.00 save 5.50	1 £ 14 sh. save 1 £ 6 sh.		

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NAME	Subscription Paid to	NAME	Subscription Paid to
The Fix-It Shop, Utah.....	July, 1935	H. D. Erskine, Vt.....	Jan., 1924
J. A. Torrey, Mass.....	Dec., 1933	E. Fowler, Penna.....	Jan., 1924
W. C. Watt, Kansas.....	Dec., 1930	Breen & Son, Ireland.....	Dec., 1923
I. J. Stiles, N. J.....	Jan., 1929	M. Lamoreaux, Ohio.....	Dec., 1923
Waddington Farm, W. Va.....	Mar., 1928	C. R. Davis, N. Y.....	Dec., 1923
A. A. MacLean, Nev.....	Feb., 1937	F. W. Copeland, Kansas.....	Dec., 1923
John H. W. Schneider, Cal.....	Dec., 1926	J. L. Tomlin, Kansas.....	Dec., 1923
J. Taylor, Calif.....	Oct., 1926	H. A. Davis, N. Y.....	Dec., 1923
A. Garver, Ohio.....	Feb., 1926	E. H. Troyke, Ill.....	Dec., 1923
J. N. McIntire, Penna.....	Jan., 1926	D. B. Johnson, Iowa.....	Dec., 1923
W. Post, N. Y.....	Jan., 1926	G. Horton, Calif.....	Nov., 1923
Powell Brothers & Whitaker, Eng- land.....	Jan., 1926	J. Spratt, Mass.....	Nov., 1923
O. Temple, Idaho.....	Jan., 1926	F. Watkins, N. H.....	Nov., 1923
N. Karlewics, S. Dak.....	Jan., 1926	F. Koppins, Ala.....	Nov., 1923
E. L. Lahn, N. Y.....	Dec., 1925	Y. C. Lienert, S. Australia.....	Oct., 1923
J. A. Hulvey, Ill.....	Dec., 1925	W. B. Abell, N. Y.....	Oct., 1923
Williams & Turner, W. Va.....	Dec., 1925	W. R. Turner, Man.....	Oct., 1923
J. J. Devine, N. J.....	Dec., 1925	C. Nelson, Neb.....	Sept., 1923
P. Nelson, Minn.....	Dec., 1925	H. M. Andersen, Calif.....	Aug., 1923
M. Kennedy, Tas. Australia.....	Dec., 1925	Camp Bros., Texas.....	Aug., 1923
A. J. Wassmuth, Idaho.....	Nov., 1925	L. C. Larsen, Iowa.....	July, 1923
J. G. H. Mallett, Queens, Australia.....	Nov., 1925	S. Effenaar, S. Africa.....	July, 1923
A. W. Speir, Ohio.....	Nov., 1925	G. L. DeWitt, Mont.....	July, 1923
W. R. Clepper, Texas.....	Nov., 1925	W. W. Gregg, Texas.....	July, 1923
G. H. Isley, Mass.....	Nov., 1925	W. R. Stroupe, N. C.....	July, 1923
Reynolds Bros., Penna.....	Sept., 1925	O. C. Young, Mich.....	June, 1923
F. W. Krens, Calif.....	Aug., 1925	Otto Sippel, Penna.....	June, 1923
C. E. Allen, Neb.....	Aug., 1925	A. Chapman, N. Y.....	June, 1923
E. A. Spangberg, Oregon.....	May, 1925	C. Birely, Md.....	June, 1923
D. M. Kile, Okla.....	Apr., 1925	F. H. Shupe, Penna.....	June, 1923
G. Gullgren, Iowa.....	Apr., 1925	J. C. Stover, Penna.....	Apr., 1923
G. Frericks, Minn.....	Mar., 1925	W. Schoonover, Penna.....	Apr., 1923
V. Priesnitz, Wisc.....	Mar., 1925	J. M. Rumire, Iowa.....	May, 1923
E. Price, Ill.....	Feb., 1925	Lowndale Bros., Mo.....	Mar., 1923
D. C. Garber, Ohio.....	Feb., 1925	J. Carswell, Ark.....	Mar., 1923
J. H. Kurk, Ill.....	Feb., 1925	G. E. Glasier, Ohio.....	Mar., 1923
E. E. Hiteshue, Ohio.....	Feb., 1925	G. Fath & Co., S. Africa.....	Mar., 1923
H. F. Schreiber, Penna.....	Feb., 1925	T. Bradley, N. S. Wales.....	Mar., 1923
C. M. Adams, Conn.....	Jan., 1925	L. T. Needham, Ill.....	Feb., 1923
J. S. Damm, Iowa.....	Jan., 1925	G. C. Disinger, Missa.....	Feb., 1923
J. M. Withers, Hawaii.....	Jan., 1925	J. Hughes, Ohio.....	Feb., 1923
F. H. Jarvis, Ind.....	Dec., 1924	J. Wieber, Minn.....	Jan., 1923
Geo. Tatum, Jr., Fla.....	Dec., 1924	Z. A. Enos, Minn.....	Jan., 1923
I. Clark, Va.....	Dec., 1924	W. G. Wise, Calif.....	Jan., 1923
A. N. Estes, Va.....	Dec., 1924	F. S. Bishop, S. Africa.....	Jan., 1923
J. Bailey, Man.....	Dec., 1924	J. Curran, Ariz.....	Jan., 1923
G. Q. Naylor, Md.....	Dec., 1924	S. P. Harney, Mont.....	Dec., 1922
Halvorson Brothers, S. D.....	Nov., 1924	W. Breckner, Okla.....	Dec., 1922
P. Schicks, Wash.....	Nov., 1924	J. Pabina, Neb.....	Dec., 1922
H. E. Snyder, Ore.....	Nov., 1924	P. Frederickson, Iowa.....	Nov., 1922
J. A. Stewart, Ky.....	Oct., 1924	L. O. Leirus, Ill.....	Nov., 1922
C. Richenecker, N. Y.....	Oct., 1924	W. Lawson, N. Zealand.....	Nov., 1922
W. L. Ertholf, N. J.....	Oct., 1924	W. O. Grant, Cal.....	Oct., 1922
J. W. Hewson, S. Africa.....	Sept., 1924	W. H. Miller, Iowa.....	Oct., 1922
Ed. Larson, N. D.....	Sept., 1924	A. O. Martin, Idaho.....	Sept., 1922
R. T. Monk, Ill.....	Sept., 1924	O. A. Mortimer, Idaho.....	Sept., 1922
W. T. De Young, Ill.....	Sept., 1924	H. J. Hyatt, Wash.....	Sept., 1922
Charles Wells, Colo.....	Aug., 1924	J. N. Skow, Iowa.....	Sept., 1922
H. G. Weaver, Penna.....	Aug., 1924	A. D. Standiford, Wash.....	Sept., 1922
Working Men's College, Viet.....	June, 1924	T. Temkiewicz, Que.....	Sept., 1922
F. M. Kenoyer, Neb.....	June, 1924	A. Peliffer, Ohio.....	Aug., 1922
R. C. Frederick, N. D.....	May, 1924	W. D. Valentine, Iowa.....	Aug., 1922
H. L. Fenton, N. Mexico.....	May, 1924	G. Hoffman, N. Y.....	July, 1922
J. Carl, Iowa.....	May, 1924	J. Erman, Ark.....	July, 1922
J. E. Little, Penna.....	May, 1924	W. K. W. Hansen, Penn.....	June, 1922
H. I. Brenzel, N. Y.....	Apr., 1924	Robert Tochter, Cal.....	June, 1922
W. E. Parr, Iowa.....	Apr., 1924	J. Van Marter, N. Y.....	June, 1922
F. Bramek, Neb.....	Apr., 1924	F. Norrie, Yukon Ty.....	Jan., 1922
L. A. Hulen, Calif.....	Apr., 1924	E. Anders & Son, S. Australia.....	May, 1922
J. E. Ray, Minn.....	Mar., 1924	Louisa Carriage Wks., Va.....	May, 1922
A. Hulstrand, N. D.....	Mar., 1924	S. Smith, Tex.....	Apr., 1922
W. F. Riske, Wis.....	Mar., 1924	J. W. Haar, La.....	Mar., 1922
B. F. Selbert, Calif.....	Mar., 1924	D. W. Smith, La.....	Mar., 1922
H. Roeschwetter, Mo.....	Mar., 1924	E. A. Dillon, Nev.....	Mar., 1922
W. B. Briant, N. J.....	Mar., 1924	D. F. Kuster, Wash.....	Mar., 1922
A. Boesch, N. Y.....	Mar., 1924	G. F. Johnson, Mich.....	Feb., 1922
A. R. Johnson, R. I.....	Feb., 1924	R. H. Keith, Iowa.....	Jan., 1922
F. Jacobs, Ohio.....	Feb., 1924	F. H. Joslin, Mass.....	Dec., 1921
A. J. Ferry, Ill.....	Jan., 1924	J. B. Scheidler, Ind.....	Dec., 1921
E. G. Walker, Calif.....	Jan., 1924	J. H. Ickes, Penn.....	Dec., 1921
		E. Willis, Colo.....	Dec., 1921

NAME	Subscription Paid to	NAME	Subscription Paid to
O. M. Johnson, Minn.....	Oct., 1921	W. Vallance, N. Y.....	Nov., 1919
H. Feldus, N. be.....	Sept., 1921	W. Schald, Wisc.....	Nov., 1919
A. S. Pratt, New York.....	July, 1921	J. Delane, Neb.....	Nov., 1919
W. F. Kline, Kansas.....	May, 1921	P. Gudmunson, S. Dakota.....	Nov., 1919
E. Mossner, Queens, Australia.....	Apr., 1921	R. Ramach, N. W. Ter.....	Nov., 1919
E. Slec, N. Y.....	Feb., 1921	J. Nalsmith, N. Zealand.....	Nov., 1919
A. R. Skerritt, N. Y.....	Feb., 1921	W. H. Lick, Ohio.....	Nov., 1919
A. Seidel, Neb.....	Jan., 1921	W. N. Shofield, Mo.....	Oct., 1919
W. Ruple, Penna.....	Jan., 1921	Short Brothers, Iowa.....	Mar., 1919
N. A. Englund, Iowa.....	Jan., 1921	W. H. Crumly, Ind.....	Mar., 1919
O. Gerhardestein, Ohio.....	Jan., 1921	G. W. Bryant, Vt.....	Mar., 1919
W. C. Rutter, Illinois.....	Jan., 1921	C. E. Spriggs, Kansas.....	Mar., 1919
J. L. Jester, Mo.....	Jan., 1921	A. H. Dutton, Vermont.....	Mar., 1919
G. A. Moffatt, Yukon Ty.....	Jan., 1921	F. W. Rosenberger, Pa.....	Mar., 1919
O. A. Huff, Penn.....	Dec., 1920	E. K. Van Gorden, N. Y.....	Mar., 1919
J. T. Rowe, Iowa.....	Dec., 1920	Ed. Moon, Ind.....	Mar., 1919
W. Parsons, Ont.....	Dec., 1920	J. Hellman, Illinois.....	Feb., 1919
Eisler Bros., S. Dak.....	Dec., 1920	J. Hauser, Ky.....	Feb., 1919
J. Krahulec, Ill.....	Dec., 1920	I. D. Benton, Neb.....	Feb., 1919
L. F. Kelholz, Penna.....	Dec., 1920	J. H. Denny, Kansas.....	Feb., 1919
F. Marigraf, Minn.....	Dec., 1920	F. S. Fuller, Colo.....	Feb., 1919
S. Wright, N. Y.....	Dec., 1920	O. Gunderson, Minn.....	Feb., 1919
T. P. Consodine, Mass.....	Dec., 1920	Conrad & Hortis, Texas.....	Feb., 1919
J. D. Fox, Neb.....	Dec., 1920	J. E. Franks, Ind.....	Feb., 1919
W. Trener, Washington.....	Dec., 1920	A. L. Smith, S. C.....	Feb., 1919
A. G. Palmquist, Minn.....	Dec., 1920	B. H. Bueter, Ky.....	Feb., 1919
J. E. Richards, Penna.....	Dec., 1920	Leo Standley, Ind.....	Feb., 1919
J. Delane, Neb.....	Nov., 1920	Lyle Standley, Ind.....	Feb., 1919
J. H. Staats, Mo.....	Nov., 1920	G. S. Spreyer, Nev.....	Feb., 1919
George F. Wardle, S. D.....	Nov., 1920	Walter Brothers, Ohio.....	Feb., 1919
H. C. Strine, Penna.....	Nov., 1920	P. F. Marcotte, Calif.....	Feb., 1919
C. M. McNutt, Mass.....	Nov., 1920	J. E. Brasher, Ky.....	Feb., 1919
J. M. Mapes, New York.....	Nov., 1920	B. H. Ellis, Iowa.....	Feb., 1919
W. Condon, New York.....	Nov., 1920	G. W. Tibbott, Mo.....	Feb., 1921
F. Strieff, Wisc.....	Nov., 1920	A. C. Dunston, Michigan.....	Feb., 1919
L. P. Mortensen, Mich.....	Nov., 1920	F. Payton, Okla.....	Feb., 1919
A. W. Brennenman, Ind.....	Nov., 1920	P. J. Martin, Okla.....	Feb., 1919
Thomas Scurr, New Zealand.....	Oct., 1920	F. M. Clark, Maine.....	Feb., 1919
W. H. Finlay, New Zealand.....	Oct., 1920	R. L. McKenney, Ky.....	Feb., 1919
O. E. Brekke, Washington.....	Sept., 1920	George W. Carter, Illinois.....	Feb., 1919
R. D. Simkins, Penna.....	Sept., 1920	C. H. Norcross, N. H.....	Feb., 1919
L. R. Garvin, Ohio.....	Sept., 1920	L. Soucheb, Kansas.....	Feb., 1919
A. E. Reeve, Mass.....	Sept., 1920	W. G. Merrifield, Mo.....	Feb., 1919
G. W. Phillips, Utah.....	Aug., 1920	J. B. Griffiths, Iowa.....	Feb., 1919
F. A. Poole, South Africa.....	July, 1920	J. Troy, Penna.....	Feb., 1919
C. Gibson, Ill.....	July, 1920	T. Bay, Michigan.....	Feb., 1919
H. M. Whitman, Neb.....	July, 1920	E. K. Moore, Maine.....	Feb., 1919
The Goldfield Diamond Drilling Co., Victoria, Australia.....	July, 1920	J. N. Tyler, Ohio.....	Feb., 1919
G. M. Robben, Kans.....	July, 1920	W. A. Tinsley, Kansas.....	Feb., 1919
K. J. J. Rees, S. Australia.....	July, 1920	O. Schuettel, Texas.....	Feb., 1919
F. Felts, Ohio.....	June, 1920	J. Holt, Kansas.....	Feb., 1919
W. M. Puryear, Ala.....	June, 1920	E. E. Leed, R. I.....	Feb., 1919
W. L. Patterson, Okla.....	June, 1920	George Dank, N. Y.....	Jan., 1919
D. Hardy, Viet.....	June, 1920	A. Dehlinger, Wisc.....	Jan., 1919
E. Malpas, S. Australia.....	June, 1920	L. Barto, Wisc.....	Jan., 1919
A. J. Hamburg, Ohio.....	June, 1920	N. W. Wallace, Ohio.....	Jan., 1919
C. M. Holton, Okla.....	June, 1920	N. T. Howard, Mo.....	Jan., 1919
L. G. Graf, Ohio.....	June, 1920	O. S. Hopper, Mo.....	Jan., 1919
A. Mellum, N. D.....	June, 1920	O. F. Stang, Mo.....	Jan., 1919
J. A. Schmitz, N. D.....	May, 1920	I. B. Green, Iowa.....	Jan., 1919
P. Wright, Calif.....	May, 1920	A. Ellsperman, Illinois.....	Jan., 1919
F. Greer, Queens.....	Apr., 1920	A. M. Kanelman, Illinois.....	Jan., 1919
L. J. Morman, N. Y.....	Apr., 1920	H. L. Wolf, Penna.....	Jan., 1919
Alex. Zimmer, Ont.....	Apr., 1920	J. Bell, Penna.....	Jan., 1919
Clark Bros, Cal.....	Mar., 1920	D. F. Carter, Okla.....	Jan., 1919
W. H. Leonard, Penn.....	Mar., 1920	J. S. Rush, Ohio.....	Jan., 1919
Ed. Grimm, Tex.....	Mar., 1920	F. P. Ludwig, Penna.....	Jan., 1919
H. L. Place, S. Australia.....	Mar., 1920	L. F. Grelman, Illinois.....	Jan., 1919
J. Hiernenz, Minn.....	Mar., 1920	S. F. Reitz, Penna.....	Jan., 1919
G. S. Akers, Va.....	Mar., 1920	F. C. Upright, Michigan.....	Jan., 1919
J. H. Wilsey, Penna.....	Feb., 1920	W. F. Breedlove, Mo.....	Jan., 1919
W. Nagowitz, Wisc.....	Feb., 1920	J. F. Murphy, Nev.....	Jan., 1926
J. F. Leiss, N. J.....	Feb., 1920	J. C. Cagley, Mo.....	Jan., 1919
C. M. Jacobsen, Utah.....	Feb., 1920	W. E. Eymann, Mont.....	Jan., 1919
E. Gunther, Iowa.....	Jan., 1920	F. Watson, Mo.....	Jan., 1919
L. H. Willson, Vermont.....	Jan., 1920	Alex Burgett, Penna.....	Jan., 1919
D. R. White, Kansas.....	Jan., 1920	C. S. Schmidt, Calif.....	Jan., 1919
P. Bianchi, Texas.....	Jan., 1920	George Lindsey, Illinois.....	Jan., 1919
R. S. Crisler, Ky.....	Jan., 1920	A. J. Grubbs, Ky.....	Jan., 1919
T. A. Mahar, Me.....	Jan., 1920	D. Shearer, Ohio.....	Jan., 1919
T. Horne, Ariz.....	Jan., 1920	W. S. Jones, Mo.....	Jan., 1919
H. B. Draper, Ind.....	Jan., 1920	J. Moriarty, N. J.....	Jan., 1919
H. H. Schoob, Wyo.....	Jan., 1920	L. E. Stirling, N. D.....	Jan., 1919
L. A. Coats, Mont.....	Jan., 1920	F. Suess, Ohio.....	Jan., 1919
I. Blough, Penna.....	Feb., 1919	Tornquist & Johnson, Illinois.....	Jan., 1919
H. Kraft, Calif.....	Dec., 1919	O. L. Buck, N. Y.....	Jan., 1919
S. Barber, Iowa.....	Dec., 1919	A. M. Juchhelm, Miss.....	Jan., 1919
M. Martin, S. D.....	Dec., 1919	G. Brewer, Miss.....	Jan., 1919
R. I. Ryberg, Iowa.....	Dec., 1919	O. R. Smith, Tenn.....	Jan., 1919
Dayable & Sons, Viet.....	Dec., 1919	I. Landrum, Tenn.....	Jan., 1919
E. M. Crouch, Conn.....	Dec., 1919	A. Johnson, Wisc.....	Jan., 1919
R. Werk, Neb.....	Dec., 1919	F. Telhofer, Wisc.....	Jan., 1919
J. R. Wilson, Md.....	Dec., 1919	L. Cords, Mo.....	Jan., 1919
N. Buchanan, Ont.....	Dec., 1919	A. K. Olsen, Wisc.....	Jan., 1921
P. Reif, Ohio.....	Dec., 1919	W. F. Holland, Calif.....	Jan., 1919
A. Larsen, Ida.....	Dec., 1919	L. A. Turner, Colo.....	Jan., 1919
H. Andresen, Iowa.....	Dec., 1919	S. K. Anderson, Iowa.....	Jan., 1919
I. F. Powers, N. J.....	Dec., 1919	A. Danberry, N. J.....	Jan., 1919
J. G. Granlund, Conn.....	Dec., 1919	G. A. Bulx, N. Y.....	Jan., 1919
J. B. Horn, N. Mexico.....	Dec., 1919	Ellis Well Company, Va.....	Jan., 1919
A. J. Haun, Calif.....	Dec., 1919	R. S. Carter, Illinois.....	Jan., 1919
A. Clark, Viet.....	Dec., 1919	C. Schacht, Oregon.....	Jan., 1919
O. J. Wilson, N. H.....	Dec., 1919	M. H. Sutton, W. Va.....	Jan., 1919
Booth, MacDonald & Co., N. J.....	Dec., 1919	O. Cobb, Texas.....	Jan., 1919
A. Luke, Neb.....	Dec., 1919	C. H. Hale, Okla.....	Jan., 1919
J. W. Rupp, Wisc.....	Dec., 1919	J. A. Holpp, W. Va.....	Jan., 1919
F. G. King, N. Y.....	Dec., 1919	Ruby & Kennedy, Illinois.....	Jan., 1919
C. A. Smith Penna.....	Nov., 1919	W. H. Ruby, Penna.....	Jan., 1919
J. B. Beaudet, Quebec.....	Nov., 1919	J. T. Newhouse, N. Y.....	Jan., 1919
		A. G. Whiteman, Neb.....	Jan., 1919



The Horseshoer

The Mechanical Side vs. the Physiological Side of Shoeing

FRANZ WENKE.

We are running across some men, horseshoers, too, who see only the mechanical side of shoeing, but never the physiological one. Take for instance the very prevailing custom of adding heel calks to a shoe, without a toe calk. Now, it may be seen at a glance, that a heel calk alone will throw the whole boney column out of true. That is: the point of the os pedis will be thrown downward and forward and the articulations of the foot and the leg up to the carpus are straightened beyond their proper angle. This will naturally be very uncomfortable to the horse, if not downright painful. To overcome this the animal will flex its knees, and have the appearance of being kneesprung, and if persisted in shoeing that way (with heel calks only), the horse will be chronically kneesprung eventually. Another drawback of this method is the removing of the frog from the ground, and consequently losing frog pressure, a condition which should be avoided as much as possible. Horses, and mules, too, should be shod flat whenever possible, and where heels are required a toe calk should also be used, in order to keep the foot level. Of course, this refers only to normal shoeing, and does not take pathological cases into consideration.

Veterinary Notes for the Shoer

Conducted by Dr. Powell of Considine and Powell, Cleveland, Ohio.

Two Common Foot Diseases

There are two common conditions affecting the horses' feet which are associated very closely, but are two

distinct diseases. One is Thrush and the other is Canker.

Thrush

This is a disease of the frog characterized by a discharge from it of a black and offensive pus and accompanied by more or less wasting of the organ. It is more often seen in the common draft horse than in any other breed, due to the conditions of servitude and not the fault of the breed. It is more often seen in the horses used on streets in towns than those used in the country.

Causes—The most common cause of thrush is the filthy condition of the stable where the animal is kept. Hard work on rough and stoney roads may also induce the disease as may the change from dryness to excessive moisture. Muddy streets and roads excite this abnormal condition of the frog. Contracted heels, scratches and navicular diseases are predisposing causes of thrush. Mares are more liable to contract the disease in the hind feet when the cause is filth, while the gelding and stallion are more likely to develop it in the forefeet.

Symptoms—The first symptom noticed, unless the horseman is a very careful observer, will be a very offensive odor from the foot. On examination there is simply an increased moisture in the cleft of the frog accompanied by the offensive smell. Later there is considerable discharge which at first is thin, watery and highly offensive, changing to a thick puriform matter which rapidly destroys the horn of the frog. This disease rarely produces lameness, but may when the whole frog is involved in the diseased process.

Treatment—The cleft of the frog

should be pared out and all diseased tissue eliminated. A small piece of absorbant cotton or okum should be saturated with a 10% solution of formaldehyde and packed around the frog. Do not bandage. This should be dressed once a day in the same manner for three days, then every other day for three treatments.

This is all the treatment that will be required.

Canker

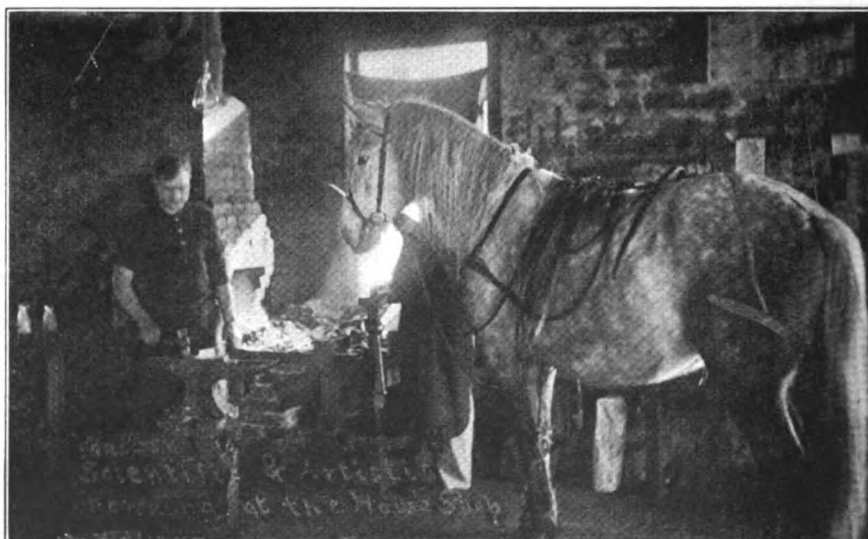
This is a chronic diseased condition of the membranes directly under the horn, frog and sole due to the rapid reproduction of a vegetable parasite. The diseased condition starts at the frog and extends to the sole and wall. It not only destroys the sole and wall, but sets up a chronic inflammation in the deeper tissues thereby destroying the normal function of the horns secretive cells and preventing the injury being repaired.

Predisposing Causes—Standing animals in continued dampness especially in unclean stables where there is no drainage and animal standing in manure and water. Injury to the feet which allow the entrance of a causative parasite.

For unknown reasons animals with thick skins, heavy hair, fleshy frogs, and flat feet are especially liable to canker.

Exciting Causes—This disease is caused by a parasite that grows rapidly in filth and is of vegetable origin. It is often transmitted from one animal to another when they stand together.

Symptoms—Canker usually is confined to one foot at first but later spreads to the other feet and



WAITING FOR HIS SHOES FROM B. F. GRAVIS, OF MICHIGAN



all four feet may become affected.

In the early stages there is no lameness noticeable, but later the foot becomes sensitive especially on rough roads and finally when sole and frog are largely destroyed there is a severe lameness.

When the disease follows an injury the wound does not heal and there is a profuse, thin, watery, fetid discharge. This discharge has a very offensive odor and undermines and destroys the surrounding horn. The under tissues are dark colored, swollen and in some parts covered with a soft yellowish horn which is immersed in the secretion and constantly undergoing disintegration. This secretion dries on the surrounding parts and forms cheesy masses of horny matter. When the disease is not from an injury there is first noticed a very offensive odor of the foot, liquid secretion from the sides and cleft of the frog and rotting away of the horn of the frog and also of the sole.

Treatment—The treatment of this disease is very unsatisfactory.

All horn that is undermined by the fetid secretion should be removed. Apply okum soaked in a 10% solution of formaldehyde held in place by moderate pressure. Keep all growths trimmed down well and a new formaldehyde pack should be applied once every other day.

Collection Records Simplified

W. B. PARKER.

It is so undeniably true that many slow accounts are actually lost through inattention due in large part to cumbersome records that it is not necessary to dwell on this fact. The experience of every collection manager will verify this. But, while some have profited by the knowledge, many have felt that a thoroughly efficient system was too expensive for them to adopt, both in first cost and the expense of upkeep. This belief, however, is far from the fact. It is the lack of such a system that is truly expensive. Even an energetic collection manager is apt to neglect giving his slow accounts the proper attention if it is necessary to go through the ledger to ascertain the exact status of each one, and even in a small business memory is a very uncertain substitute for handy and accurate records.

If Mr. Debtor's account is overdue this should automatically come to the attention of the business man-

ager at brief and regular periods,—also if Mr. Debtor promises a payment at a certain date the promise should also be remembered at the right time. Experience has proven that no ledger system, either old style, loose leaf or card will produce these results except at a time cost so great that few men can spare it. The

such a system would be still more cumbersome as well as too expensive, but this idea is based on the supposed necessity of installing regular card filing cases, ordering specially printed cards, and overlooking the slight amount of time actually required to keep up such a record, as well as the time saved in having the

BETTER WORK

A Few of the Things We Can Do AND WHAT WE CARRY IN STOCK

We Wish to Inform the Public

That we have enlarged our shop and equipped same with new wood-working machinery and new, up-to-date tools for doing iron work, which enables us to do work at very short notice. We expect to manufacture wood beams for one and two horse plows; also gang plow poles or tongues and we expect to do a general line of new and repair work. We wish to mention a few of the many articles we carry in stock:

Axles for one and two horse wagons, a full line of wagon irons, wagon hubs, wagon rims, wagon spokes, wagon tires, wagon tongues, wagon shafts. A full line of Buggy, Surry and Road Cart axles, Buggy, Surry and Road Cart wheels, hickory buggy spokes and rims, buggy shafts, single trees, steel shaft ends, shaft irons, shaft couplings, shaft springs; buggy bodies and seats, buggy springs and surry springs, buggy body hangers, and body loop irons, step irons, seat bolts, buggy and surry dashes, and whip sockets, buggy and surry fifth wheels, axles, beds, and perch poles, buggy top bows, and bow sockets inside and out, top joints, top rubber and mohair. We build buggy and automobile tops. We carry a nice line of paints, and paint buggies. Our shop is complete for repairing vehicles and farm implements. Don't forget we braze broken cast iron, steel, copper and brass.

COME TO SEE US. WE WILL TREAT YOU RIGHT
Remember our shop is located on Main St. near Walston's corner

E. L. BRAXTON & BRO., SCOTLAND NECK, N. C.

HOW THE BRAXTON'S KEEP BUSINESS COMING THEIR WAY

right method is to keep a separate card record of all accounts that are past due, and to keep this record partially in duplicate. That is, there should be an alphabetical card record, giving all the ledger data as well as notations of promises to pay in the future, and there should also be a chronological card record which will call the attention of the collection manager to each of these accounts at the right time.

At first thought it might seem that

data wanted in handy form. While a regular filing equipment, including specially printed and ruled cards, is a fine thing to have, yet it is quite possible to get the same results with a couple of cigar boxes and cards cut from odd stock that can be found at any printers. It is thus possible for the smallest business to make use of the most efficient business method without the usual high cost for expensive equipment.

The important point is to have the



method of keeping the records as nearly automatic as possible. When the monthly statements are made out each overdue account should be entered on the duplicate card system mentioned. The form shown will be found convenient.

This card shows at a glance a past due balance of \$251.10, and a promise to pay February 20th. It is a handy record to refer to in case more credit is requested before settlement is made, and no printed card or special ruling is required in order to carry out the idea.

At the same time this card is made

file is not required as the clips are placed on the cards in the alphabetical file with a different colored clip to indicate the particular week in the month that the day clip refers to. This method does not appeal to the writer as being nearly as simple and effective as the chronological file, but it is certainly better than making no effort at all to bring accounts up for attention at the proper date.

In one business house where the writer was at one time employed, the method of making the proper notations on the cards and keeping

How to Rim a Heavy Wheel

R. H. LOMAS, in Work.

To rim or "ring-up" a heavy cart wheel, presuming the spokes are already tanged, first prepare a fellow pattern of $\frac{1}{2}$ -in. board, giving it a little less compass than the true arc of the wheel, as determined by the following rule: For every foot the wheel is in height add $\frac{1}{4}$ in. to the diameter of the circle for the pattern up to 3 ft., and from that height to 5 ft. 6 in. add $\frac{3}{8}$ in. per foot. Procure the fellowes ready sawn out to as near the required size and sweep as possible, face them on one side, correcting any winding there may be, and gauge and dress to thickness. Then mark out to pattern and dress the belly to the line, leaving the sole a little full. The length of the fellow is generally obtained by placing it over three spokes close up to the shoulders, and marking it at the centre of the two outer spokes; or the length can be obtained by multiplying the diameter of the wheel by 3.1416, and dividing by the number of fellowes, setting off the length obtained with the tape on the sole of the fellow. To mark the ends of the fellowes, set a bevel so that when the stock is held to the belly or inside with the blade across the face, and then reversed, the blade coincides with the former position as shown by Fig. 1. Mark and saw off the ends of the first fellow to the bevel obtained, and square across the other way. Lay the wheel face downwards on the wheel stool, place the fellow on the tangs of two spokes close to the shoulders, the ends projecting equally between the adjacent spokes, and mark the centre of the spokes on the belly, also both sides of the tangs on the face. Mark the fellow and spokes so that its place can be found again after being taken off. Square lines across the belly through the marks indicating the centre of the tangs, and gauge across these lines from the face for the centre of the holes. Bore the tang holes with a twist auger, using the lines on the face of the fellow as a guide to get them radial. Spring the spokes together and knock the fellow on close up to the shoulders. Fig. 2 illustrates a useful lever for springing spokes. Take the next fellow, cut it to length, dressing the ends to the bevel, place it on the ends of the spokes with the left end close to the first fellow, and mark the position of the tangs as before. Having fitted the second fellow, drive out the right end a little

Mr. Slow Debtor - Chicago, Ill.						
CHARGES				PAYMENTS		
$\frac{1}{1}$	160	80	$\frac{2}{5}$ promised balance $\frac{2}{20}$	$\frac{1}{5}$	100	00
$\frac{1}{7}$	240	30		$\frac{1}{15}$	50	00

A CARD SYSTEM KEEPS THE PROMISES TO PAY RIGHT BEFORE YOU

out another one should be filed in the chronological file to come up February 20th with simply the name of the debtor on it, so that attention will be called to this account at exactly the right time. In the case of past due accounts where no promises have been made the card should come up weekly until some definite arrangement has been secured. Where a clerk is employed it should be his duty to bring these cards to the manager daily, with the morning mail.

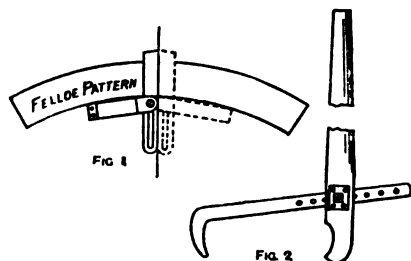
In the absence of a regular clerk it should be made a matter of the first importance for the manager himself to take up the cards daily as well as to attend personally to the making of the proper notations and the proper filing. The time required is so little that it is merely a question of getting into the habit. There is another way of handling that some managers prefer when taking personal charge of the collection files, and this is what is known as the signal system. Various colored clips are utilized, each color representing a different day in the week. Where this system is used a chronological

them up-to-date was as follows:—When the mail came in it was opened by the office boy at a table next to the bookkeeper's desk. Any mail containing remittances, was handed to the bookkeeper, who made the proper entry in the ledger and then sent the letters on to the credit man who could then make the proper entries on his alphabetical card files, answer any part of the letter that pertained to his department, and pass them on to the sales manager. The mail not containing remittances followed the same route, except that it did not require the attention of the bookkeeper.

In this connection there is another point worth at least passing attention, and that is that one of two rules should be made and rigidly adhered to. Either only the manager and clerk should be allowed access to the cards at all, or if others are allowed to look them over, they should not be allowed to take them out of the box. Many persons, are often careless as to the proper return of filing cards to the files, and carelessness of this kind is liable at any time to prove costly.



until the joint between the two is parallel, then "cut in" the joint by running a saw through. Knock the felloe up close to the shoulders of the spokes again, and proceed with the others in the same way, working from left to right, and numbering



HOW TO RIM A HEAVY WHEEL

them in succession so that they can be put on in their respective places again after being taken off. When cutting in the last felloe joint, leave it $\frac{1}{8}$ in. open on the sole. Knock the felloes off, and with the adze take a shaving out of the ends to ensure them coming up close all round the edge. Bore the dowel holes in the ends of the felloes, 3-16 in. from the centre towards the sole and $2\frac{3}{4}$ in. deep for a 5-in. dowel, using a twist bit. With the same bit, bore a hole through a piece of 1-in. hard wood, and drive the dowels tightly through it to ensure a good fit. Arrange all the felloes the same way up close together on the bench, and drive a dowel in one end of each. Replace the felloes on the ends of the spokes with the dowels entering the holes bored for them, and knock them up all round a little at a time until snug at the shoulders. Then pare a little off the ends of the tangs, split them crosswise of the rim with a chisel, and wedge them up. Cut off the ends of the wedges and trim the face of the wheel up, using a straight-edge for the purpose. Dress the sole of the rim square all round, and gauge the width of the tyre $\frac{1}{8}$ in. from the face. Dress to the lines with the draw-knife and spokeshave, and round-in with the file and the liberal use of glass-paper.

Oxy-Acetylene Welding for Boilers

M. KEITH DUNHAM.

(Oxy-Acetylene Engineer.)

This month two subscribers' ask questions on boiler welding by means of the oxy-acetylene blow pipe. The questions and answers should interest all readers.

Question.—We have a little two horsepower steam boiler which is nearly new; it once had a hot fire in it with no water which, of course, caused most of the tubes to leak and one place the tube sheet

cracked from one tube to another. New tubes can easily be put in a boiler, but to put in a new tube sheet is a big job. Can a small crack like that be welded successfully? If so, would the whole boiler have to be pre-heated or only a small place around the crack? And what kind of filler would you use? Could anything like that be done on larger boilers such as traction engines?

Reply.—It is rather difficult to give definite advice on this job with the meagre data given. Without a sketch of the boiler, it is impossible, except in a very general way, to help you solve this problem.

If you can reach the tube sheet with the welding torch, either in a downward or overhead position, which I presume you can, the job offers no difficulties, if you can weld steel and if you pay a little attention to the effects of the strain set up by welding.

For a filler rod, use Norway iron or a high grade mild steel. Bevel the crack as you would any other welding job and clean it thoroughly of rust, scale or dirt and at the same time examine the metal closely to determine whether there are other cracks or small fissures adjoining the one you mention.

Now as metal expands when heated and contracts when cooling and as the expansion takes place the easiest way, it is necessary that you make some provision to offset the possible breaking of the weld when cooling. In this instance you may heat with the welding torch another section in a line with the direction of the weld.

Assume that the crack is as shown in the engraving, represented by the heavy line. If you heat the section shown by the dotted line, that is ahead and behind the crack and in line with it, the crack will open up, then the weld is quickly made and cools without fracture, since allowance has been made for the fact that cold metal occupies a smaller space than hot metal by first expanding the welded section.

There are, of course, other ways of looking after expansion and contraction and there may be other matters to look after in this particular job. Read following answer to another correspondent regarding boiler repairs before you start welding this crack.

Question.—We have cracks to weld in all kinds of boilers, both horizontal and vertical and fire box and locomotive style. The cracks are naturally located in different parts so that it is impossible for us to give you any definite location for cracks in this sort of work. The last job we had was a crack over the fire door in a locomotive boiler. After welding the

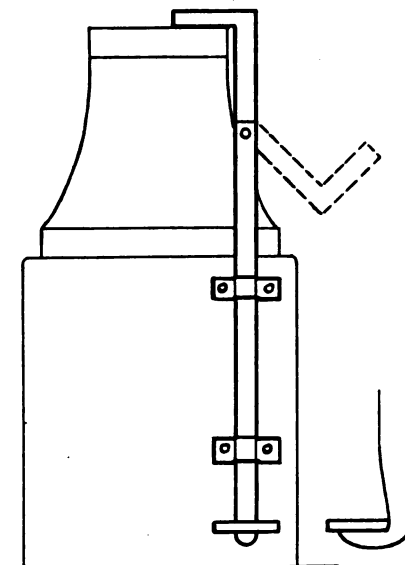
crack it opened up after cooling so that we had to put a patch on the crack. Any information that you can give us in order that we may be successful in doing work of this kind will be greatly appreciated.

Reply.—To answer this question properly would require a text book of considerable size. To successfully weld boilers requires the following: Pure gases, Properly designed apparatus. Correct welding material. Boiler construction knowledge. Ability to understand expansion and contraction. Long experience in steel welding.

The lack of any one of these means failure, yet it is a fact that boiler welding is attempted by persons possessing not one of these requirements. The result, of course, is failure and this failure not only hurts the reputation of the shop doing the work but as well affects adversely the entire oxy-acetylene industry. Certainly oxy-acetylene welding of boilers is practical—many firms are using it daily—but more than any other work in the oxy-acetylene field, it requires real study and the number of workmen competent to make boiler repairs are very few. This is all the more reason why it should be studied, since workmen in this field are highly paid.

Importance of Pure Gases

In the early days of acetylene welding when both the acetylene and oxygen were generated by the user,



A DEVICE FOR HOLDING THE SHOE ON THE ANVIL WHILE CALKING IT

it was especially difficult to make a sound steel weld, due to the depositing in the molten metal certain impurities which came from the materials from which the gas was manufactured. It being cheaper now to purchase oxygen in cylinders than



to manufacture it from chlorate of potash, one source of trouble has disappeared, since the tank oxygen is of a very high grade. There are still many acetylene generators which deliver impure gas, however, and the user of such a generator is handicapped in steel welding and probably doesn't know it. The use of dissolved or tank acetylene removes the chance of using impure acetylene, since manufacturers of this gas, dry and purify it before compressing it into the cylinder.

Properly Designed Apparatus

The duty of the welding torch is to mix the gases in the proper proportions and burn them in a properly shaped flame. All welding torches do not do this; yet to the inexperienced operator all flames look alike. Space does not permit a discussion of apparatus—it is essential, however, that the equipment be constructed correctly, since one of improper design gives a flame ruinous to steel welding.

Correct Welding Material

All welding rods are not alike. To simply state that a steel or iron welding rod should be used on boiler welding is not sufficient. The welding rod should be one supplied by an oxy-acetylene manufacturer or supply house. Such a welding rod should be as free as possible from sulphur and phosphorous and should be low in carbon.

Knowledge

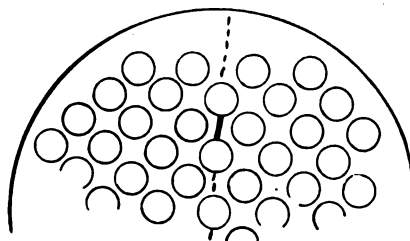
Gases, apparatus and welding material are things you buy. By purchasing from responsible concerns with a reputation to maintain, the chances are that the right start is made. Thereafter, it is up to the operator. What should he know before he starts on a boiler? Undoubtedly, the most important subject is

Expansion and Contraction

I think that most welders will agree with me in the statement that expansion and contraction is the least understood and the most important item of oxy-acetylene repair work. Otherwise good welds are continually spoiled because the workman did not take into consideration the fact he is heating metal and expanding it and that when it is cold it contracts. The article does not necessarily break,—it may distort, however, and be useless or it may leave a strain which will easily break afterwards.

Successful boiler welding requires a thorough understanding of expansion and contraction. For that matter so does the successful welding of anything else. There really is nothing

hard to understand if we get down to simple cases. Heat expands—cold contracts. Remember that the expansion takes place the easiest way not the most difficult. Take two plates of mild steel, say one-quarter inch thick and six or eight inches long and start welding them with both edges butted together. If you start welding on one end, you will note that as you come to the other end, the edges are beginning to overlap—not very much but if the weld was longer they would overlap considerably. Now, take two similar plates and weld simply one end and then the other and then weld the entire length and note how the plates have buckled. Now, if we could take



BOILER WELDING IS DIFFICULT

these two plates and bolt them securely so that they could not move and then make the weld, the chances are the weld would break in cooling, though it might "pull" enough in the cold area to remain whole yet leave a strain which would quite easily break. These illustrations are sufficient to prove that expansion cannot be prevented if metal is heated; yet how often have you put a welding flame on a piece of metal without thought of this? Boiler welding is an invitation to this carelessness since mild steel is ductile and will bend and twist considerably hot or cold before it breaks—result, the workman starts welding without thought or care of expansion. If the weld holds, he considers himself a good workman; if it breaks, he thinks he's unlucky. But a test of the weld which has held would probably show its weakness, since there would be an internal strain in the metal if no attention was paid to expansion and contraction.

Until the principle of expansion and contraction is understood and the operator has the judgment necessary to decide how best to overcome the strains set up by welding he had better not weld a boiler. Get this knowledge on scrap material or on articles where failure will not have the probable results as failure would on a boiler.

The principle used in acetylene

welding to overcome the bad effects of expansion and contraction are the same, irrespective of whether the article is a boiler, an automobile cylinder, a crank case or a pulley wheel. Other sections may be heated, portions cut, rivets removed in places, expansion limited by the use of cold water, or a patch may be dished and made slightly larger than the hole it is to fit, so that when the weld cools, the patch straightens out. The proper method is one of individual judgment but *always* expansion is the first thing to take into consideration.

It may readily be seen that a knowledge of boiler construction is not only desirable but necessary in order that expansion and contraction may be fully grasped. It may be necessary at times to remove rivets, replacing them after the welding is done, perhaps take a tube out or cut out a section and replace it with a patch rather than attempt a weld. On some portions, welding should not be attempted at all—but it is essential that the welder preferably, or at least someone working with him, have a knowledge of good boiler construction.

Ability to Weld

Necessarily, the workman must be a good steel welder, with a knowledge of metal greater than is required for other lines of welding. Boilers are subjected to strains by sudden heating and cooling, and especially around the fire box, the metal may be burnt or oxidized in places and nearly always there is rust or scale or dirt to contend with. The workman must understand these conditions and know how to overcome them. In addition to this, he must be able to weld in a vertical and overhead position—not to slap it on, but make a sound weld.

Inspection Rules and Regulations

Before any boiler welding is attempted, secure from the proper state officials or insurance companies, a copy of the requirements covering the welding of boilers—find out just what part of boilers you may weld, what is necessary before the inspector will pass it, etc.

General Suggestions

Now, above all things, don't get the idea that boiler welding is impossible or impractical or that I am throwing cold water on acetylene boiler welding. Read again the requirements I name at the beginning of this answer and you will then realize that each item is of tremendous importance. Grasp one at a time, study from text books or trades papers the elementary principles of



welding steel and the principle of expansion and contraction, weld again and again boiler iron in all positions, horizontal, vertical and overhead and if possible, secure a competent boiler welder to teach you. These efforts are well worth while but don't attempt to weld boilers until you know you will be successful at the work.

A Scotch Entrance Gate of Extreme Beauty

JOHN Y. DUNLOP

The accompanying engraving shows the entrance gate at Hoptown House, Queensberry, Scotland. As may be seen, the entire design for the entrance gates is unique and on classic lines.

This entrance structure is built of sandstone and is very massive and imposing in appearance. On each side of the gateway five bays or arches are formed with monolithic twin columns. The side railings fill these arches part way up and pass between the twin columns. In this way the rail is continuous on each side of the entrance way.

The railing has three horizontal rails and is filled in with alternate, long and short balusters with scroll-pointed ends. At equal spaces from the columns ornamented scroll panels are added which lend variety to the entire rail.

The gateway is constructed in two halves with a fixed ornamented grille above. The plain gate has its lower portion filled with scroll work while a narrow scroll panel extends the full height next to the hinged and meeting stiles. The elaborate panels at the sides and the highly decorative overgate make a harmoniously complete design.

It is to the proportions of the entire structure, rather than the elaborate details of the overgate that we owe the appearance of completeness and satisfaction of design.

Something About the Farm Tractor

JOHN MAPPELBECK

IN THE COUNTRY GENTLEMAN

Some farmers hesitate to buy tractors on account of finance. They lack the money to invest now, or are cautious about borrowing because profits on crops seem to be uncertain for the next year or two, war disturbances and slack times having affected markets.

Others have horse equipment on hand, and feel that there is plenty of time to change over to the power basis.

Still others doubt their ability to run tractors, or are chary about trusting such

machines to ordinary farm helpers. This last has been found so common a reason for delay in purchase that the manufacturers are working to overcome it by teaching tractor operation.

Every purchaser of a tractor is given lessons by a service man who goes to the farm and stays until the customer understands how to run the machine. This practical instruction is followed by a correspondence course in many cases, entering into higher technical matters. To spread tractor knowledge still more widely most of the tractor companies hold tractioneering schools at their factories and branch depots.

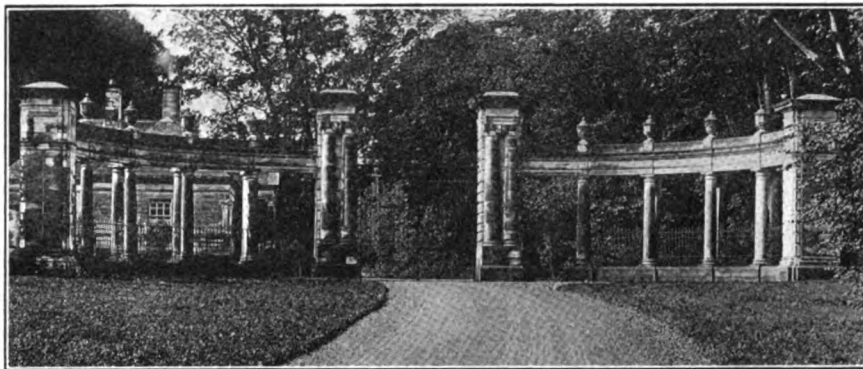
The actual running of a tractor is not at all difficult. It is as easy as running an automobile. Every person who has learned to run an auto will remember the sense of mystery and awe he had before he took his seat beside the instructor for the first time, and how this disappeared in a few hours as he learned to start, steer and stop, and gained confidence. In less than

one of the sisters appeared in an old gown and announced her determination to learn that machine. In a few hours she was running it alone, pulling six plows, while the obliging service man busied himself installing a pumping plant up at the bungalow. The other sister tackled the tractor next day, and between them they finished their fall plowing alone.

The actual operation of a tractor is as simple as that.

Indeed, it is too simple, if anything. For the chief cause of tractor trouble lies in the lack of respect that the average farmer or his hired man has for the machine when he discovers how little brain is needed to start, steer and stop. The temptation to investigate is then so strong that he begins to take things apart and to fool with adjustments. Then the difficulties of tractioneering begin.

The service man knows that in a few days, perhaps in a few hours, after he has taught the novice how to start, steer and stop a tractor, there will probably be a



ENTRANCE GATE, HOPETOWN HOUSE, QUEENSBERRY, SCOTLAND

a week he was running a car as a matter of instinct.

The tractor is an automobile, built for work and strength instead of speed and pleasure. It is the big draft team contrasted with the standardbred roadster, easier to control because it moves deliberately. The first lessons, as with the auto, consist in starting, steering and stopping.

The mechanism is about the same as that of an automobile. There is an explosion engine out in front to give power, and this has a carburetor to feed the fuel to the cylinders, an ignition apparatus to fire the charge, a water-cooling system to carry away excess heat, and so on. The power plant is linked to a clutch and transmission. This moves the wheels and pulls the plows.

Two Sisters and a Tractor

As in the automobile, most of the mysteries have been made automatic. The ordinary work of starting, steering and stopping is so simple that anybody can learn it after a little practice. Farmers and all sorts of farm hands from the highly intelligent down to coolies and peons, do so after a lesson or two. On big ranches in the West the work is often done with batteries of large tractors, run by day laborers who are paid simply to sit on the seats and steer, one repair man making all the adjustments necessary to keep the machines running day and night.

A new tractor was shipped to a ranch owned by two sisters, maiden ladies, all alone in the world. A service man went along to teach their hired man how to run the machine. Just as the latter finished his lessons, however, he quit. Whereupon

hurry call for him to return and find out why the machine no longer runs. Nine times out of ten it has struck work because the novice investigated the mechanism and made adjustments until he caused needless trouble.

In the schools of tractioneering held at factories, owners and operators of tractors can systematically learn the fundamentals that enable them to make repairs when something really does go wrong, as well as to run a machine with the skill that gives low operating costs and long life.

These schools are usually held in winter, when farmers can attend most conveniently. The courses last from one to four weeks.

Instruction is generally free to owners and their employees. Others pay instruction fees. These are on the basis of twenty-five dollars for the full course, or ten dollars for the last week, which summarizes all the teaching and is a fair course in itself. If a paying student purchases a tractor within six months the fee is deducted from the price.

Students who come for such instruction group roughly into one-third owners, one-third employees sent by owners, and the rest men who want to learn tractioneering as a trade. The chief requirements in a student are interest in tractor operation, backed by ordinary farm handiness and farm sense.

The first lessons center on the engine, as a rule. Students are shown how a gas engine is constructed, how it works, how the fuel is taken into the cylinders, turned into power and the spent gases exhausted in a regular cycle. Carbon troubles are explained, directions for diagnosis are



given, and practice follows in the grinding of valves and adjustment of piston rings.

Then the ignition is taken up—a very important subject because three-fourths of all tractor and automobile trouble is found in ignition, and the ignition apparatus, being electrical, is most delicate and likely to be most mysterious to the novice. From simple demonstrations of electricity with a magnet, and instructions in the operation and care of dry cells and storage batteries, the student goes on to a point where he is permitted to take down and reassemble a high-tension magneto under the instructor's eye. This is followed by trips through the shops, where students

Tractor farming is different from horse farming. Having more power and speed, work is done in different ways. It is estimated that a good draft team can walk about sixteen miles a day, pulling a plow, and to plow one acre must walk eight miles. A tractor with four plows and a wider cut turns over an acre in less than two miles. So the work goes much faster.

More power means deeper plowing and a better seed bed. It also means the plowing of soils that could not be worked profitably with horses. In the California delta country, for instance, there are soils so soft in the plowing season that horses cannot get a footing, and so thickly sown with rank tules that horses cannot turn

reader who does not wish his name disclosed, gives me the chance I have been waiting for:

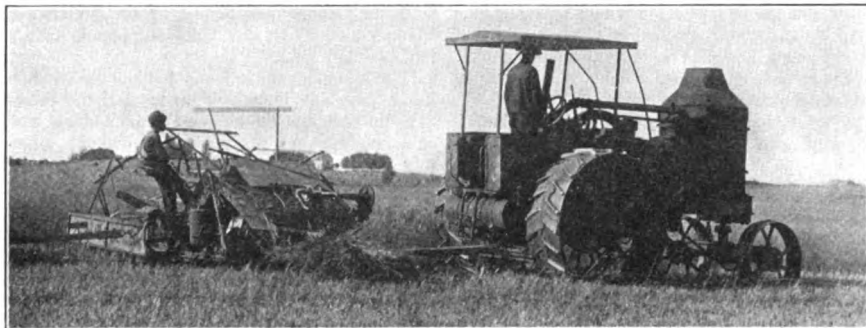
Cincinnati, Ohio.

We want some advice in advance about a situation that is likely to arise in the near future with one of our customers—a good buyer, but not always prompt in his settlements. On March 1st he owed us several hundred dollars, most of which was considerably overdue. We had been after him to pay it without result, until about the middle of December he came in and proposed to give us a note in payment for three months, bearing interest. We accepted it, thinking it a good way to put the account on an interest basis, and now we hear that he is in a bad way and only those who get in early are likely to get anything. We would like to go after him right away, but the note is not due until June 18th, and it seems that we must hold off until that time. Please advise us if this conclusion is right and tell us if there is any way to get out of the situation we have been placed in.

This is pretty nearly a typical case. The same thing is happening all the time. Both wholesale and retail dealers, especially the former, when some customer gets behind, will propose a note as the next best thing to cash. And the idea is all right, if it is carried out properly. The proper way to carry it out is never—where there is the slightest question about the present and future standing of the debtor—to accept the note *in payment* of the account. It should be accepted only as collateral security, with an agreement that in case it becomes necessary in the opinion of the creditor, the latter can immediately begin suit on the debtor for the original account.

When a note is accepted *in payment* of the account, you have merely postponed payment that far ahead, and no matter what happens to the debtor's finances meanwhile, you can only sit down and wait.

The average business man does not



THE TRACTOR CAN BE USED FOR ALL FARMING OPERATIONS FROM PLOWING TO HARVESTING

see how engine castings are made, parts are machined and forged, all the parts of a tractor are assembled, and what is the function performed by each part.

Why Things Go Wrong

To the average man this shop work is the most interesting part of the course, and to the company it is the most costly to impart—for the groups of interested students scattered through different sections of the factory, investigating and listening to explanations, get more or less in the way of the workmen, and are apt to cut down production. Then follow lectures on fuels, lubrication and bearings. Outside experts are sent by oil companies to explain the properties of gasoline, kerosene, distillate and the various lubricants. The class reabbatts bearings, times ignition, and names the parts and functions in the different groups of machinery that make up the tractor.

When the class has advanced far enough it is given lessons in running various types of tractors. The courses being held in winter, it is not possible to give actual field work. But things are secretly thrown out of adjustment by the instructor, and pupils are set to locate the trouble. Considerable attention is given to the ordering and quick fitting in of repair parts.

In one class last winter a farmer expressed considerable irritation because the teacher was always asking him to find out things.

"Don't keep asking me why," he protested. "I came up here to learn how to fix my tractor when it gets out of kilter, not to be always finding out why this or that is wrong."

A little talk in a corner soon persuaded him that just this ability to answer why would save him time and trouble in the field when anything went wrong back home.

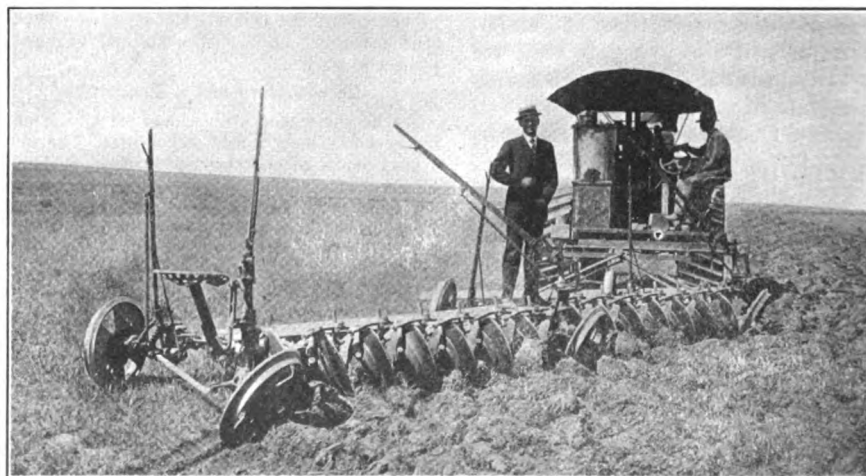
The full courses on tractor operation, extending over a month, include considerable instruction on soils and tractor cultural methods.

them. The tractor-plowing contractor makes money plowing these tough soils because he has ample power.

So the student taking a regular tractor course at the factory goes away with knowledge that enables him to correct machinery troubles, and with new ideas about the possibilities of power farming.

Accepting Notes in Settlement of Accounts

For a long time I have had on file a memorandum to write something about the loose practice of accepting the notes of a debtor in settlement of an account. Other things have heretofore crowded it out but the receipt of the following letter from a Cincinnati, Ohio,



IT RELIEVES THE FAITHFUL HORSE OF THE BURDENSOME TOIL AND DOES THE WORK BETTER



understand the difference between the two ways of accepting the note, and he therefore accepts it, as a rule, in a way which could easily be construed into an intent to take it in payment of the account.

The creditor who takes a note in payment of an account is not only no better off than he was before, but he is really worse off because he cannot enforce his claim as soon as he could before he took the note. His original claim on the book account was just as clear and good, and almost as easily proven in court, as his new claim on the note. Therefore, he gains nothing by changing the form of his claim from book account to promissory note, but as I have already said, he actually loses.

Everything depends on the way in which the note tendered in settlement is taken. The general rule is that a promissory note given in settlement of an account is not to be considered as having been accepted in payment, unless there is an agreement to that effect between the parties. Usually there is never any actual agreement between a creditor and his debtor, that a note given by the latter shall be taken in payment or not in payment. The debtor, who is usually behind in his accounts or he wouldn't tender the note at all, says something like this: "I'll give you a note to fix up (or clean up, or settle, or cover) that account of mine." The creditor takes the note and later the court may have to decide what was meant by "fix up," or "clean up," "or settle," or "cover," or whatever the expression was. Remember that the agreement may be implied from the conduct of the parties, and if the court holds that the note was taken in payment it means that the old account is dead, suit can never be brought on it, the note has been substituted for it, and the only remedy is to try to collect that, which can only be attempted, as I have explained, upon the date when it comes due.

Where a note is taken without stipulations of any kind, there is always the chance that a court may decide in that way. There are many cases in which this made all the difference between losing the account and collecting it in full.

Even where it is clear that a note was not accepted in payment, but only as collateral security, the creditor will not usually be allowed to bring action on his original claim until the note comes due, because when he accepted the note he gave the debtor that much more time and

the court will not allow him to go back on his promise.

What is the best way to safeguard one's self against such possibilities? There are two main ways:

First—Make the note payable on demand or at sight instead of at some future date. Such a note can be sued on at any time. Naturally the debtor will not always agree to this, for his reason for giving the note is to gain delay until some future time. He will often agree to it, however, when the creditor gives his word not to negotiate the note or do anything with it before a certain date unless it becomes necessary.

Second—If the note has to be made payable at a future time, then have the debtor sign a memorandum when he gives it that the note is for collateral security only, and granting permission to the creditor, before the note matures if he considers it necessary, to begin suit on the original account. If the creditor does begin suit on the original account before the note matures, he must give the note back.

The only thing I can say to my friend from Cincinnati is that he can answer his question by applying what I have said above, to the facts of his own case. If he can prove that he did not take the note in payment—although in his letter he says that he did—he can proceed against his debtor at once on the original account. If he did take the note in payment—and the fact that it bears interest is strong evidence that he did—he must wait until its maturity, no matter what happens.

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Queries— Answers— Notes

Wants Wagon Information.—I am taking up wagon making and would like to have some information on the same, especially on wheels and skaines, setting boxes and the kind of machinery that would be best. A. H. McLANE, Ohio.

Calking Machine Queries.—Will some

brother of the craft who is familiar with the calking machine, state through the columns of this interesting paper which machine he considers best, and if it will turn two heels at one heat, and if it does the work to his entire satisfaction.

H. R. JOSEPH, New Jersey.

That Cramping Horse.—In reply to Mr. S. Yager about the cramping horse: If Mr. Yager will take this horse, when he comes again to be shod, and stand between his hind legs in place of on the side, I don't think he will have much trouble shoeing him that way. It doesn't give the horse a chance to lay on you because you are on the wrong side. I shoe all my crampers and horses that want to lay on me that way and it works fine, if the horse doesn't kick.

CHAS. J. THURBER, New York.

Air Tank to Blow Fires.—I see Mr. T. E. Wilson, Mo., asks about running fires with air compressor and tank. I would like to know a little more about it myself. How large a tank must one have and how much pressure to run one fire for half a day? Any information will be appreciated.

CHAS. J. THURBER, New York.

Disc Sharpener Query.—I would like some information in regard to the Just-rite Plow Blade and Disc Sharpener. Are they profitable to install in the shop? I would like to hear from some one who has or is using one. Would like to see something on this subject in an early issue. Any information on this subject will be very much appreciated.

A. W. TAYLOR, Oklahoma.

The Farmer Shoers.—I am about to "throw up the sponge". I have worked at the trade for 40 years and never before have I been disgusted with horse shoeing, but when a farmer can go to a hardware store and buy shoes and calks for less money than I can, as they do here, it's time to quit. They shoe their own horses, and then expect me to keep a warm shop for them to come to and sit around to swap lies and then they kick because I don't open up by 7 o'clock and have the shop red hot. If there is no way to stop dealers from selling shoes and calks to horse owners, in a few years there won't be a blacksmith in business. The young men won't learn the trade for that reason.

A. T. NIVER, New York.

Another Faker—Look Out Folks.—In the January number on page 100, was an article entitled, "The Faker is Again Heard From." Perhaps it will interest you to learn of my experience with him. I have a neighbor who makes his living with his wits, selling furniture polish, receipts and other things. One day he came over to my place and before I knew anything about it, he smeared some dope on the channel brass which goes around the dashboard of my auto, he also put some on one of the hub caps. Thinking it was some harmless brass polish and he being my next door neighbor, I hesitated to drive him away which I should have done. In a moment he had the brass shining like nickel where he applied his dope and was ready to sell me the receipt for same, but of course I was not in a hurry to buy. Presently, while we were talking, I noticed a crack on the channel around the dashboard right at the band and I called his attention to it and remarked that it was strange how I never noticed it before. He stated the crack surely had been there before his preparation, which was harmless was put on. When he left me I watched the crack and it kept on increasing until the channel broke clear through. I now watched the hub cap and



the acid did worse there. It caused it to crack in all directions and completely ruined it. I removed the channel, reinforced it on the inside and soldered it on the outside yet it can be noticed that it has been broken. That chap did me at least \$5.00 damage in spite of the fact that he is my next neighbor and I have done work for him on several occasions for little or nothing. Therefore, I agree with Benton not only to keep your hand on your pocketbook, but also to whistle for the bull dog when a chap of this caliber comes within hailing distance.

S. BECK, Arizona.

The Cornell Shoeing School—I am writing this to say a few words for the Shoeing School of New York State Veterinary College at Cornell University. I was one of the members of the first class two years ago this winter and it has paid me well and is paying me every day. I think every horseshoer ought to take advantage of this school. I am now getting better prices and a better class of horses to shoe. I find that there are men who are willing to pay for good work and want a shoer who knows his business; that is one who understands the anatomy of the horse's foot and leg. When I left Cornell Feb. 28, 1914, Prof. Asmus said to me, "Do good work and charge for it and you will get the best class of horses to shoe." And I found it so. Of course, I get a lot of vicious horses to shoe because I have the goods to handle them with.

I would like to have more of the correspondents tell what they get for shoeing. We get here for 0 to 4 new 30c, reset 15c; No. 5 35c and 20c; No. 6 and 7 40c and 20c and No. 8 50c new and 25c resetting. Bar shoes according to size and double the open shoe. The drive calked shoes, I hate to mention them, but we get \$2.00 per set for No. 4. For No. 5 \$2.25; No. 6, \$2.50; No. 7, \$2.75; No. 8, \$3.00. Calks up to 9-16 are 5c put in, and to customers who put them in themselves 4c. A hardware house here is dealing them out for \$1.60 per hundred to horseowners. I call this outrageous. I will not sell a calk for less than 4c. I will carry them over first before I sell them for any less.

HARRY BABCOCK, New York.

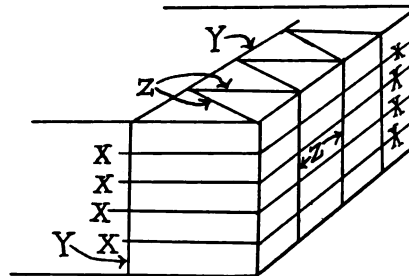
Making Wedges Quickly—I am sending my method of making spoke wedges which I hope will be of advantage to some of the brother smiths who have a hand saw to cut them with. This work can be done on no other kind of saw but can be done very rapidly with a little practice with this kind of saw. A 25-lb. calk box can be made full of $\frac{3}{8}$ -inch wedges in 5 or 10 minutes. Use a hardwood stick, 3 or 4 inches square. Saw straight into the end at regular intervals of $\frac{3}{8}$ or any width desired. These cuts I have marked x. The second is marked y, which must not be cut clear across, but left to hold the cuts while finishing. The third and last operation, z, finishes the wedges. The thicker the timber, the faster the wedges are made.

J. M. ALBRIGHT, Indiana.

Shoeing Pointers—I was just reading different views on shoeing and my experience has been this: That a horse's foot was made to walk on and not to be cut up when a shoe is put on. The way to help a contracted foot is to fit the shoe just as close around the heels as possible and let the weight come on the heels. Do not cut the heels off and not have them touch the shoe. But let them rest on the shoe. My experience with most shoers that I have employed is that they cut away the heel and fit the shoe too wide. The bar shoe, which Brother Bundy speaks of, I found

never helps contracted feet but a bar shoe should be used where a horse has a wire cut foot or on feet that are very flat and have no heels. We find the most contracted feet in horses that have a straight foot. If you will fit the shoe real close and let the heels rest on the shoes and not trim the brace out, you will have surprising results. Use a leather pad and pack the hoof well with okum and Wool Fat. Keep the horse to work.

This has always done the work on horses that were contracted. To shoe a horse that has corns do not cut the corn at all but let the shoe rest on the heels. Do not cut the heels down and the braces out as that was what caused that corn in the first place; the weakening of the quarters. If the corn is sore and very mushy, put a leather pad on and take Wool fat and warm it up so you can pour it in when you have the shoe nailed



MAKING WEDGES QUICKLY

on. Then pack some okum in, not too tight. In three or four weeks, have the horse reshod and be very careful not to trim and cut the heels or braces, but leave them there. In about six months the corn will be gone and the horse will go without the leather pads. Try it and you will find out for yourself. Be sure to trim toes down well and set shoe back as far as possible, with toe calk set back on shoe as far as you can.

H. O. WIESE, Iowa.

Oxy-acetylene and Auto Work—I have just finished reading the latest number of "Our Journal" and it is needless to say that I have spent my time well. I have just read that I should write a few lines for publication, and tell of that hard job I had done, so, I will try to tell you of a small job I did some time back. I think you will agree that we are beginning to wake up down here in this country. I wrote you last year that I had one of those Oxy-acetylene welding machines and that I was well pleased with it. Well, I guess I am. I weld most anything that comes to the shop for welding.

A while back one of my good customers was plowing with his Big Bull tractor and one connecting rod came loose and it kicked the whole bottom out of the crank case and knocked some of the pieces clear away. He got in his car and run over to see if I could weld it up. I said, "Yes, bring it over." I prepared it by breaking up a casting and fitting the pieces in to fill up the space. Then I welded it up so it rang like a bell. I got some twelve or fifteen dollars and saved him a cost of about fifty dollars and he went on his way rejoicing and I was also happy.

I have just taken up aluminum welding and have had fine success with it, and have done some fine work. I am teaching my son who is 17 to weld also. Yes, if some of the boys of our craft want to get a welding machine, tell them to go ahead for they are O. K.

Yes, I am also getting my part of the

auto repair work, too. I like it fine. I pick up some good money at it. You know it is cash, or no go and it beats sharpening a plow and "charge it" for an indefinite length of time, all hollow.

I have made my shop larger and I do auto work in the rear end of the shop, and I think if the business keeps picking up, I will also occupy the most of the front end of the shop for that purpose also, as I am fatally tired of that old charging racket that goes with the plow work.

D. W. MURPHEE, Texas.

The Bar Shoe and Corns—I see a letter from Mr. Bundy asking if a bar shoe allows the foot to expand. I would say it does not. If we should put it on a horse that spread the foot when the weight came on it, that might do, but we can't. We are like the man that wanted to move the earth, if he had money enough and a place to stand, but he had neither and he could do no more than the bar shoe especially on a foot that is contracted. I am very much interested in Mr. J. Olson's letter on balancing a horse's foot. I think he is right in every sense of the word. I have straightened lots of them myself and for contracted feet, I always find the cause is with the shell or wall and the bottom of the foot weaker, but the frog in the foot to spread the shell and keep pressure from the socket joint and navicular bone. The way I treat a foot of this kind is to pare the foot down good, and level them far out all around the frog and make the bottom as thin as I can and make a good opening between the end of the shell where it comes in contact with the frog. Then I advise the owner to use some good hoof grower to soften the shell. Put low calks on the shoe and from heels bend them down a little to take the jar off the horse and leave the frog to do its work. For a quarter crack I bend the shoe down as square as I can so as to take the weight off the quarter and lower the calk so as to level the foot.

For corns I pare them out good and deep. Sometimes they bleed, that is all the better. After it stops bleeding, I heat a rod to a very slight red and burn the corn. Then I fill the hole with hoof paste to soften and heal the sores. I have cured lots of corns this way with one or two treatments. Sometimes a stubborn corn will require more. For a gravel bruised foot, I remove the shoe and go over the foot to see that there are no nails. Then I take pinchers and start at one heel with one end on the shell and the other on the bottom of the foot (the end must touch all over the bottom of the foot) and when I hit the right place, the horse will tell me by finching. Right there I then bore a hole and let out the blood. After it is done bleeding, stop the hole with some grease. Put in with a warm wire and nine times out of ten this will end the trouble.

T. N. LEONARD, Pennsylvania.

An Oklahoma General Shop—I am sending you a couple of pictures of the interior of my shop. I have been located here for the last five years, but have been a blacksmith all my life. Was brought up a blacksmith. I do general blacksmithing and horseshoeing and am a reader of THE AMERICAN BLACKSMITH and find it the best paper of the kind I ever read. I don't see how I could get along without it.

A. W. TAYLOR, Oklahoma.

On Soldering Auto Parts—You ask for kinks in the trade. I sure like to read what others say about their way of doing things, but have not read how to solder brass in "Our Journal." I have seen others



try to solder an oil tube or a leak in a radiator with a copper that has been tinned and burned to dross, and try to clean it on a salamoniack brick and cuss a little and say that to solder a fitting on a flexible horn tube is out of the question. But I don't have such trouble. First, if my copper is not well tinned, I file off all dross solder before I put it in the fire and have it well shaped. Then heat it, but in no case do I heat it to even a dull red. I tin the copper by placing a drop of solder in a cup of dry salamoniack powder. Then punch the copper in after it. Have also a cup of salamoniack dissolved in water, to dip the copper in to clean off such smoke and dirt that sticks to it when ready to use. Second: if it is an oil tube to solder where friction has worn a hole in the side of it or a fitting broken off the end, wipe off all oil and if it is caked on it, scratch it off. Use muratic acid, just as you get it at the drug store. Apply it with a brush made by wrapping a copper wire around a small bunch of bristles from a cheap paint brush. Wipe the first application of acid off with a cotton rag. This will take all the oil off that you had not wiped off and leave the surface bright. Bend a small piece of bright galvanized iron so it will lay flat against

pump and lathe. D. M. NILE, Oklahoma.

In Reply—Irrespective of cost, the advantage is all with the individual motor installation. The advantages which go with the individual motor are in part as follows: Flexibility, because of being able to run any one machine at any time or all of them at any time. Then, also there is the freedom from line shafting and overhead belting, also freedom from belt shifting levers and counter shafts. With the one large motor to drive all machines, you will need a line shaft, several counter shafts, shifting levers, sufficient belting, depending upon the number of your machines and all of these operating overhead, no matter how well protected, are always a source of danger to the workingmen and other persons who may be in the shop. Another advantage to be gained by the use of individual motors is a saving in electrical current because of the fact that only such current is used as is necessary to operate the machines in actual use from time to time. On the other hand, if one large motor is used to operate a line of shafting, the one motor and shafting will need to be operated just as long as any one machine is being used. Very naturally, a considerable amount of power is consumed in the friction losses in the

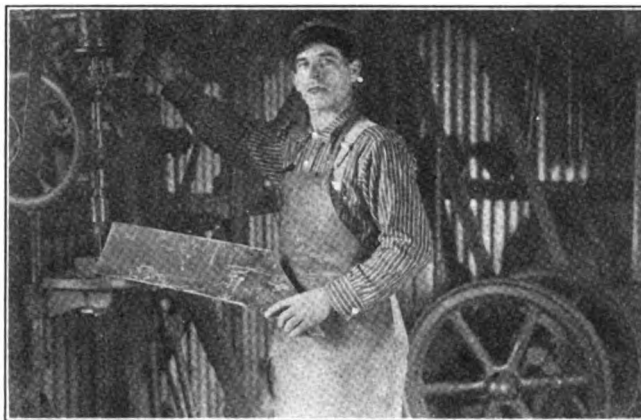
tween the two forges as well as possible. The saw table we would place as far away from the forges as possible and still have it easily accessible. In fact, it would be best in our estimation to place the saw table in another room than that in which the forges and the power hammer are located. The emery stand will be placed somewhere near the forge group depending for its exact location and upon the class of work that you generally do. If you have very much work where forged or welded articles are ground, you cannot of course, get the emery stand too near to the forges and the trip hammer.

The lathe, you will of course locate before a large well-lighted window so that any work done on the lathe can be done with as little artificial light as possible. The air pump may be located in almost any part of the shop where power is easily accessible and the pipings from this will of course, need to go through the garage or storage room and perhaps out to the front entrance of the shop. This piping should have at least two openings at the most convenient point with the necessary flexible hose attachments and patent self-opening nozzles. SUBSCRIBERS' SERVICE.

A Well Equipped Shop of Iowa—I do all kinds of general work. I employ two men



MR. A. W. TAYLOR, OF OKLAHOMA, TURNING A HORSE-SHOE



ANOTHER VIEW OF MR. TAYLOR'S SHOP—THE POWER CORNER

the place to be soldered, apply a little acid so it will go between the galvanized iron and the tube. The acid will boil and eat the zinc off the iron and deposit it on the tube in a black looking coating. Now apply the solder before the acid dries out of the zinc deposit and it will surely stick. Be sure the soldering copper is well tinned and to the proper heat.

The same use of acid will work on copper, brass, bronze, iron, cast iron and most any metal that will alloy except aluminum. You had better pass aluminum jobs to the oxy-acetylene torch. It is possible, but not advisable, to solder it.

I am always glad to have a smith from another town call at my shop when he is in town, and you that are far away, I like to read what you have to say about your kinks. Do you enjoy reading this? If so, answer it with a kink on some other line and try my way if you have no better.

OSCAR COBB, Texas.

Electric Motors and Shop Layout—I want to install electricity and would like to know which is the most economical individual motors; that is, motors for each machine or one large motor to drive all machines.

Would also like an ideal floor plan for the following machines; two forges, trip hammer, drill, emery stand, saw table, air

shafting and here again the individual motors will present a saving.

It is very apparent that electric motors cost more than shafting and belting so that in first cost individual motors are likely to be considerably higher than the single motor method of power transmission. In order to get at the actual cost and probable savings, it will be necessary for you to consider the actual conditions present in your shop. If you have not already done so, we would suggest your consulting with your local power company. They no doubt employ an engineer who can give you actual figures on such an installation as you expect to make. Individual motors in any shop using power, are ideal and their distinct advantages are usually considered in the large plant to overbalance the disadvantage of greater first cost.

In reply to your query on the matter of an ideal floor plan, would say that the placing of these machines would depend very much upon the location of the windows of your shops and as you have not marked the location of windows in your diagram, it would be impossible for us to give you an exact layout for the machines which you suggest. We would say however, in a general way, that the trip hammer and the drill should be grouped be-

besides myself and will give you an idea of what tools I have. We have three fires; cast iron fire place; two of the Canedy-Otto type and one made by the Buffalo Forge Co., all electrically driven. I have two American Calking Machines I used one of them for six years and the other for three years and they are as good as the day I got them. The oldest machine has turned heels on about 350 kegs. In that time I find it a great labor saver and help in getting work out faster and better. We do steel plugging on all our winter shoes. We get \$5.00 a span for eight shoes, 25c for old shoes and 10c extra for a new toe. I have a 100 lb. box vise at each fire and one extra heavy machinist vise on a separate bench where we have all our dies and taps.

I have a thread cutting machine that cuts from 1/4 inch to 1 1/4 inch Standard thread and 1/4 inch to 1 inch A. L. A. M. and pipe thread from 1/2 inch to 2 inches. I made special chucks for the extra dies. The machine is a Willey & Russell. It is a great time and labor saver, when cutting threads. I charge by the hour at the rate of \$1.00 per hour. I find that it pays to have good tools.

I have two emery stands, one run 2500 R. per minute. This one we use entirely for buffing and polishing. I use nothing



but the stitched canvas wheels. I have 30 of them. It saves a lot of time not to have to stop and change wheels every time you get a lay ground and running at the high speed does a better job. My emery stand that we use for grinding runs 1600 per minute and carries two 12 inch by 2 1/2 inch wheels. We get \$1.00 for sharpening and hardening a lay and \$1.50 for pointing a lay. Everything must be soft center and hardened as hard as it can possibly be made. We get \$4.00 for 14 inch, \$4.50 for 16 inch and use nothing but Star No. 1 lay.

I have a No. 3 Hawkeye Power hammer and we could not keep house without it as we use it for all kinds of forging. We have two shears; one for cutting hot stuff and the other for cold. Have also a Canedy-Otto drill that drills from 0 to 1 1/4 inches.

I have a Brooks Cold Tire Setter and would not do without it. I have read a great deal pro and con on cold tire setting but I find that it takes good judgment to set tires cold. All you have to do is to see that your wheel has not got a lot of loose tenons in the rim and that the tire is not too thin. When a tire is very thin it can be set cold, but you must grip it in 4 or 5 different places. Don't try and take it all up in one place because then you will kink it.

I find that a great many smiths you hire by the day or week don't like so much machinery as it does the work up in less time and consequently more of it than he likes to see done, as he is selling time and I am selling material and labor. Of course, his job may not be as long unless he takes a hold and learns to use the machines to an advantage to himself and me in turning out more work. I don't know what the Craft is coming to as there are no young men learning the trade and when you get one, he wants more than he can begin to earn.

I put in an oxy-acetylene welding outfit about two years ago and find that it is a good paying business. There is a good deal of practice and experimenting to do good and perfect work. The greatest thing to contend with is the expansion and contraction. When you have once got it figured out so that you can apply your pre-heating properly, you can generally weld the parts right. I never do a job, no matter how small, for less than 50 cents. I have got good results out of my machine so far and have welded everything except one large wheel. It was what they called semi-steel, or in other words, half steel and half cast iron. It is very disagreeable to do anything with, even in cutting or drilling it, I have done quite a lot of welding for C. M. St. P. R. R. Co. Their work is generally very heavy. I get good prices for all that I do for them. I generally aim to get about half the full value of the broken parts.

H. O. WIESE, Iowa.

To Make a Sand Belt.—I am making a sand belt outfit for sanding woodwork and want to know how to sand the belt.

F. B. C., Mississippi.

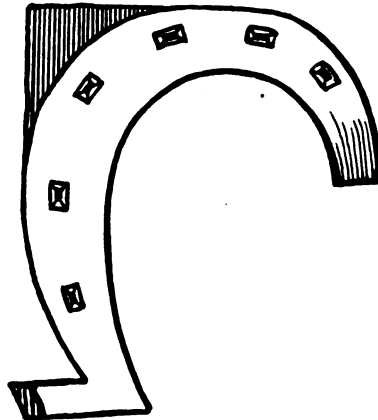
In Reply.—In order to make a sand belt, get a piece of heavy canvas as wide as the work requires, perhaps six or eight inches wide and twelve or fourteen feet long. The ends of this canvas should be sewn together, preferably without a lap. This is the canvas belt.

Now, make an adjustable frame that will hold two pulleys as wide as the belt. Place the belt on the pulleys, tightening or stretching the belt as much as possible. Now make a shallow box, one inch wider than the belt, and about six feet long.

Fill this half full of sharp white sand. Now prepare your glue and apply it hot with brush to the surface of your belt and as each section of the belt is treated with the glue, turn the belt so that it can be laid in the sand and pressed down quite hard. If a wide hand roller is to be had, the belt can be pressed into the sand very conveniently with this. Continue this treatment until the entire belt is well sanded, when it can be hung up to dry. When the belt has thoroughly dried, it may be put upon the pulleys and used for sanding operations.

J. N. H., Pennsylvania.

The Auto Situation in New Zealand.—You ask of the position of the smith of



A SHOE FOR A PECULIAR CASE

this country in relation to the incoming of the motor car. First as to Horseshoeing:—The pleasure car has in the country districts displaced many horses and to some extent has reduced the number of shoes required. In my own locality this is not so much felt as it would be, on account of increasing settlement by reason of sub-division of farms. Our Government some years ago commenced to buy up large estates and cut them up into small farms. This has steadily increased the number of farmers and the number of horses. The smaller farmer uses a horse-drawn vehicle as he lacks the means to run a car. Cars are costly here. Your Model T Ford sells here at £175. (\$852.25) So you see, the displacement of the horse by the car is about balanced meanwhile by the increased settlement. The motor has not yet displaced the horse on the farm for plowing and the like, but traction engine has cut into the draught horse road haulage considerably. What has had more effect in the last three years on the quantity of horse shoeing than all the power machines, is the fact that twice, the price of shoeing has been raised through increased cost of labor and materials and through smiths associating to get a paying price. Consequently many horse users now wear out the shoes and part of the hoof before getting new shoes put on and everywhere there is great economy in shoes and this has reduced the number by 25%, while the price has increased 40%.

So much for the shoeing-smith. Now for the vehicle maker and repairer. In this district the car has put the pleasure four-wheeler and the dog cart out of action. It has not seriously affected the use of the sulky and gig to carry three persons nor has the spring dray being affected. What we have lost in the dog cart and four-wheeler we have picked up in the

making, repairing, renovating, repainting of motor car bodies.

For instance, I know a firm that a few years ago did a wholly horse drawn trade. The business done now is larger in volume but two thirds of it is motor car work. No chassis work done; that is done at garages. Another firm I know did last year an increased turnover but their sales of new vehicles fell off 2,500 dollars. The car compensates. May coach-builders plunged into garage running in conjunction with their coachbuilding but few made money by so doing. It is claimed by men in the car business that in car repairing it is not possible to make money (this is engine and chassis repairing). Their great difficulty is in securing competent workmen. Selling cars is claimed to be a good paying business. Many have found that it is possible to have agencies and fail to sell cars.

Speaking generally, the coachbuilders have adapted their businesses to changed conditions and still make a living. There have been losses in transition but that is inevitable. Blacksmiths are better off now than before the advent of the car but they are so thoroughly organizing and lifting the business to a paying level.

GEORGE DASH, New Zealand.

City and Country Horses—A Peculiar Case.—I thoroughly agree with Mr. John A. Monroe in the January issue. In the first place it is just as he says about the man shoeing the fast horse having the "pick" to select from. We poor country smiths on the other hand, get the off-casts from all the large cities and we are expected to make these animals go sound the first or second shoeing, while perhaps the best shoers in the city where they came from have been practicing on the same specimens for nobody knows how long. Of course, we have some good horses, but generally speaking you will find a much poorer class of horses in the rural districts than in the cities.

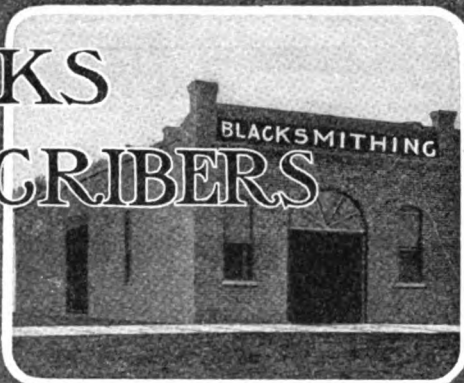
In regard to shoeing the horse unevenly I fail to see where any man can straighten a horse up by taking down the side where the most wear is. I recollect one case I had some years ago. It was a colt then about two years old and was born with one hind ankle very crooked. In fact, she almost walked on the side of her foot. The owner asked me if I could do anything for her. I said I thought so (I was only just starting in business for myself then.) I was at his place shortly after he spoke to me about this colt and I took a piece of cardboard and made an outline of the foot as near as I could and went to my shop and made a shoe something like the one in the accompanying drawing. This shoe stayed on until it was nearly all worn off. I continued to put the same style of shoe on until the colt was 4 years old and shod her for some time and she was getting very near normal. The mare was sold after that and I have never seen her since, but I know from experience that should I have taken the side of her foot off which was worn the most, I would have had to cut pure meat. As it was, I kept taking the inside of the foot down as much as possible at each shoeing with the described result.

Now, I don't want to impress the readers that I wish to cast any slurs at Dr. Seiter. Far from it, as I always enjoy his very good articles and only wish I could pen some as good. Well, I will give you a chance to get your breath now. I hope this subject will be discussed more in the future by some of the other horsehoers.

C. L. MORMAN, New York.



TIMELY TALKS WITH OUR SUBSCRIBERS



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Our Subscribers' Service.

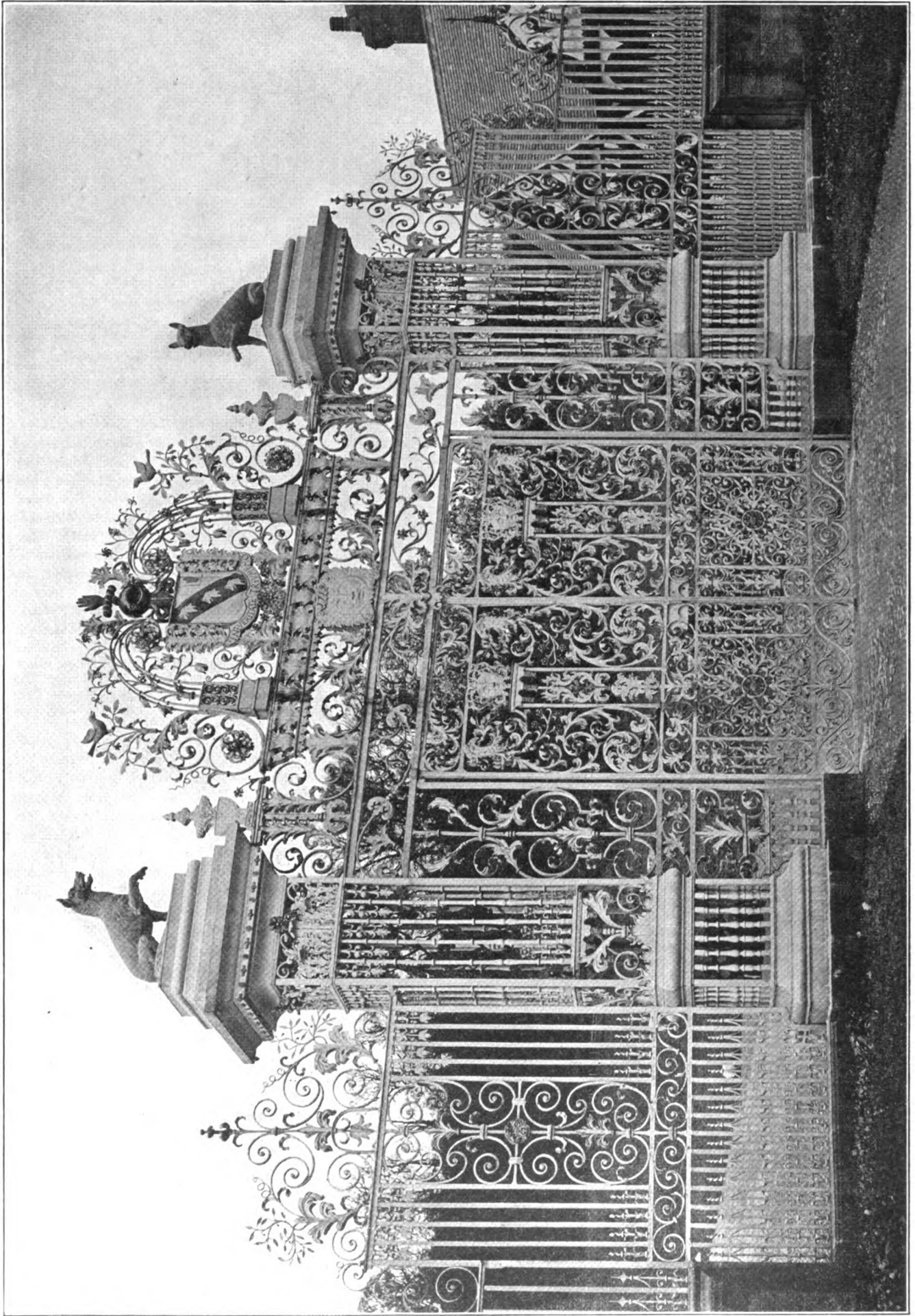
We have just added two new letter head cuts to our cut service for subscribers. These cuts are shown on another page and show just what can be done with them. If you want your letterheads, billheads and other business literature to be different than the usual smith shop stationery, get one or both of these cuts and use them on your next lot of printed matter. They are both suitable not only for letterheads, billheads, envelopes and statement blanks, but are quite as appropriate for printed announcements, hand bills, circulars and even newspaper advertising. The prices at which these cuts can be procured makes their use almost compulsory.

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If it were possible for us to increase the number of AMERICAN BLACKSMITH readers between now and a month from now, to just double the number of readers we have at present, can you imagine what an improvement it would be possible for us to make in "Our Journal"? Not only would we be able to give you a bigger paper, but with the increased number of readers, we would naturally be able to publish even a greater variety of articles.

Of course, to double our number of readers in one month may seem impossible, but if each present reader secured but just one reader, there would, of course, be just twice as many craftsmen opening and reading "Our Journal" every month. Surely it is not an unreasonable thing to ask—that you get just one new reader for our paper; furthermore, we will make it worth your while and you will be the gainer, not only in direct reward, but also in the bigger and better paper that must naturally follow.

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THE BEAUTIFUL GATES AT THE ENTRANCE TO CHIRK CASTLE, ENGLAND. (SEE PAGE 19; FOR DESCRIPTION.)



Anatomy of the Horse's Foot and the Science of Horseshoeing

"The science of horseshoeing must be studied the same as any other science if you wish to become a successful Farrier"

PROF. HENRY ASMUS*

IN a description of the foot of the horse it is customary to include only the hoof and its contents, yet, from a zoological standpoint, the foot includes all the leg from the knee and the hock down.

The foot of the horse is undoubtedly the most important part of the animal, in so far as Farriery is concerned, for the reason that this member is subject to many injuries and diseases, which, in part or in whole, render the patient unfit for the labor demanded of him. The old aphorism, "no foot, no horse" is as true today as when first expressed.

Since the value of the horse depends largely, or even entirely, upon his ability to labor; it is essential that his organs of locomotion should be kept sound; and to accomplish this end it is necessary not only to know how to cure all diseases to which these organs are liable, but, better still, how to prevent them.

An important prerequisite to the detection and cure of disease is a knowledge of the construction and function of the parts which may be involved in the diseased process; first of all, the anatomical structures must be understood.

The bones of the fetlock and foot constitute the skeleton on which the other structures are built, and comprise the lower end of the cannon bone (the metacarpus in the fore leg, the metatarsus in the hind leg), the two sesamoids, the large pastern or suffraginis, the small pastern or coronet, the small sesamoid or navicular bone, and the coffin bone or os pedis.

The cannon bone extends from the knee or hock to the fetlock, is cylindrical in shape, and stands nearly or quite perpendicular.

The sesamoids occur in pairs, are small—shaped like a three-faced pyramid—and are set behind the fetlock joint, at the upper end of the suffraginis, with the base of the pyramid down.

*Prof. Asmus is instructor in Horseshoeing at the Cornell Shoeing School, Cornell University, Ithaca, N. Y.

The suffraginis, is a very compact bone, set in an oblique direction downward and forward, and extends from the cannon bone to the coronet.

The coronet is a short, cube-shaped bone, set between the suffraginis and coffin bone, in the same oblique direction.

The navicular bone is short, flattened above and below and is attached to the coffin bone behind.

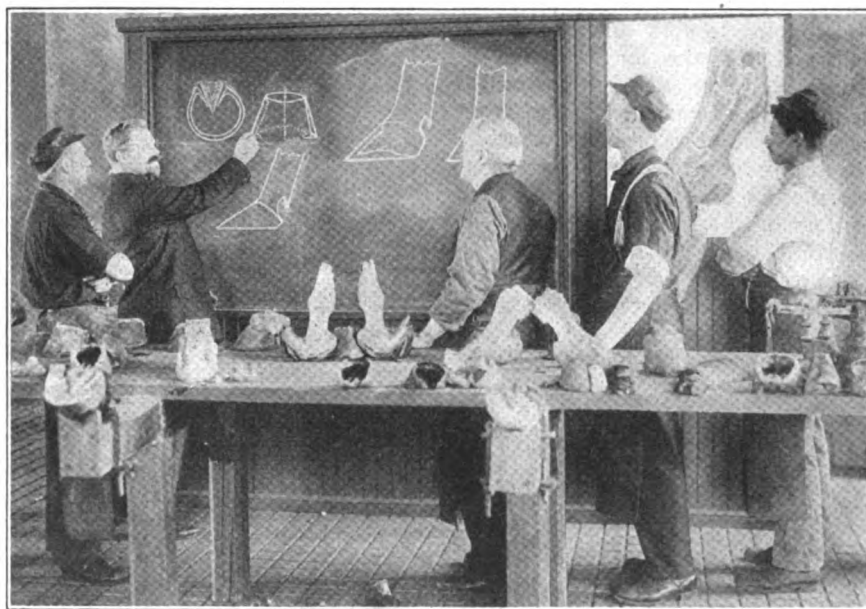
The coffin bone forms the end of the foot and is shaped like the horny box in which it is inclosed.

All of these bones are covered on the surfaces which go to make up the joints with a cartilage of incrustation, while the portions between are covered with a fibrous membrane called the periosteum.

The bones are bound together and supported by three long fibrous cords, or tendons. One, the extensor tendon of the toe passes down the front of the pasterns and attaches to the coffin bone just below the

edge of the hair; when pulled upon by its muscle this tendon draws the toe forward and enables the horse to place the hoof flat upon the ground. The other two tendons are placed behind the pasterns and are called flexors, because they flex, or bend, the pasterns and coffin bone backward. One of the tendons is attached to the upper end of the short pastern, while the other passes down between the heels, glides over the under surface of the navicular bone, and attaches itself to the under surface of the coffin bone. These two tendons not only flex, or fold up, the foot as the latter leaves the ground, during motion, but at rest assist the suspensory ligament in supporting the fetlock joint.

The foot axis is an imaginary line passing from the fetlock joint through the long axes of the two pastern and coffin bone. This imaginary line which shows the direction of the pasterns and coffin bone,



PROF. ASMUS DEMONSTRATING THE DAILY LESSON. FROM RIGHT TO LEFT THOSE IN THE PICTURE ARE: KARL KOEHLER, OF ITHACA, N. Y.; PROF. ASMUS INSTRUCTOR OF SHOEING AT CORNELL; JOHN MURPHY, OF MALONE, N. Y.; HENRY CARSON, OF MANITOBA AND O. H. NEWMAN OF ITHACA



THE ANATOMY ROOM AT CORNELL VETERINARY SCHOOL WITH SKELETONS. THE METAL TANKS CONTAIN FLESHY SPECIMENS IN PRESERVATIVE

should always be straight—that is, never broken, either forward or backward when viewed from the side, or inward or outward when observed from in front. Viewed from one side, the long axis of the long pastern, when prolonged to the ground, should be parallel to the line of the toe. Viewed from in front, the long axis of the long pastern, when prolonged to the ground, should cut the hoof exactly at the middle of the toe.

Raising the heel or shortening the toe not only tilts the coffin bone forward and makes the hoof stand steeper at the toe but slackens the tendon that attaches to the under surface of the coffin bone (perforans tendon), and therefore allows the fetlock joint to sink downward and backward and the long pastern to assume a more nearly horizontal position. The foot axis, viewed from one side, is now broken forward; that is, the long pastern is less steep than the toe, and the heels are either too long or the toe is too short. On the other hand, raising the toe or lowering the heels of a foot with a straight foot-axis not only tilts the coffin bone backward and renders the toe more nearly horizontal, but tenses the perforans tendon, which then forces the fetlock joint forward, causing the long pastern to stand steeper. The foot-axis, seen from one side, is now broken backward—an indication that the toe is relatively too long or that the heels are relatively too low.

The elastic tissues of the foot are prominently the lateral cartilages and the plantar cushion. The lateral cartilages are two irregularly four-sided plates of gristle, one on either side of the foot, extending from the

wings of the coffin bone, backward to the heels and upward to the distance of an inch or more above the edge of the hair where they may be felt by the fingers. When sound, these plates are elastic and yield readily to moderate finger pressure, but from various causes may undergo ossification, in which condition they are hard and unyielding.

The plantar cushion is a wedge-shaped mass of tough elastic, fibrofatty tissue filling all the space between the lateral cartilages, forming the fleshy heels and the fleshy frog, and serving as a buffer to disperse shock when the foot is set to the ground. It extends forward underneath the navicular bone and perforans tendon, and protects these

structures from injurious pressure from below.

The frog, secreted by the pododerm covering the plantar cushion or fatty frog, and presenting almost the same form as the latter, lies as a soft and very elastic wedge between the bars and between the edges of the sole just in front of the bars. A broad and shallow depression in its center divides it into branches, which diverge as they pass backwards into the horny bulbs of the heel. In front of the middle cleft the two branches unite to form the body of the frog, which ends in the point of the frog. The bar of the barshoe should rest on the branches of the frog. In unshod hoofs the bearing edge of the wall, the sole, frog, and bars are all on a level; that is, the under surface of the hoof is perfectly flat, and each of these structures assists in bearing the body weight.

Growth of the Hoof

All parts of the hoof grow downward and forward with equal rapidity, the rate of growth being largely dependent upon the amount of blood supplied to the pododerm, or "quick", abundant and regular exercise, good grooming and suppleness of the hoof, going barefoot, plenty of food, and at proper intervals removing the overgrowth of hoof and regulating the bearing surface.

Increasing the volume and improving the quality of blood flowing into the pododerm, favor the rapid growth of horn of good quality;



THE CORNELL DISSECTING ROOM WHERE EIGHTY STUDENTS CAN WORK AT ONE TIME



while lack of exercise, dryness of the horn, and excessive length of the hoof hinder growth.

The average rate of growth is about one-third of an inch a month. Hind hoofs grow faster than fore hoofs and unshod ones faster than shod ones. The time required for the horn to grow from the coronet to the ground, though influenced to a slight degree by the precited conditions, varies in proportion to the distance of the coronet from the ground. At the toe, depending on its height, the horn grows down in eleven to thirteen months, at the side wall in six to eight months, and at the heels in three to five months. We can thus estimate with tolerable accuracy the time required for the disappearance of such defects in the hoof as cracks, clefts, etc.

Irregular growth is not infrequent. The almost invariable cause of this is an improper distribution of the body weight over the hoof; that is, an unbalanced foot. Colts running in soft pasture or confined for long periods in the stable are frequently allowed to grow hoofs of excessive length. The long toe becomes "dished"—that is, concave from the coronet to the ground—the long quarters curl forward and inward and often completely cover the frog and lead to contraction of the heels, or the whole hoof bends outward or inward, and a crooked foot, or even worse a crooked leg, is the result if the long hoof be allowed to exert its powerful and abnormally directed leverage for but a few months upon young plastic bones and tender and lax articular ligaments.

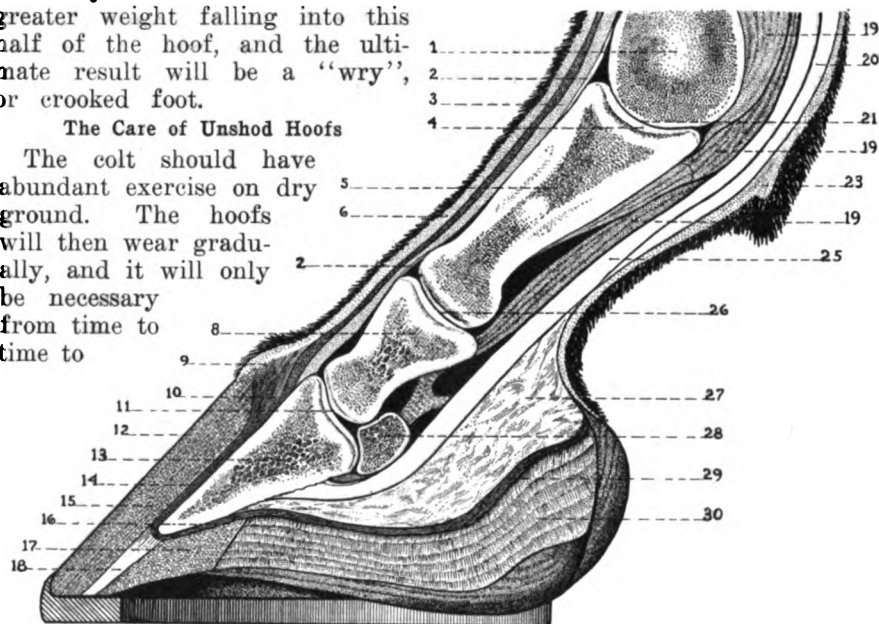
All colts are not foaled with straight legs, but failure to regulate the length and bearing of the hoof may make a straight leg crooked and a crooked leg worse, just as intelligent care during the growing period can greatly improve a congenitally crooked limb. If breeders were more generally cognizant of the power of overgrown and unbalanced hoofs to divert the lower bones of young legs from their proper direction, and, therefore, to cause them to be moved improperly, with loss of speed and often with injury to the limbs, we might hope to see fewer knock-kneed bow-legged, splay-footed, pigeon-toed, cow-hocked, interfering, and paddling horses.

If in shortening the hoof one side wall is, from ignorance left too long or cut down too low with relation to the other, the foot will be unbalanced, and in traveling the

long section will touch the ground first and will continue to do so till it has been reduced to its proper level (length) by the increased wear which will take place at this point. While this occurs rapidly in unshod hoofs, the shoe prevents wear of the hoof, though it is itself more rapidly worn away beneath the high (long) side than elsewhere, so that by the time the shoe is worn out the tread of the shoe may be flat. If this mistake be repeated from month to month, the part of the wall left too high will grow more rapidly than the low side whose pododerm is relatively anemic as a result of the greater weight falling into this half of the hoof, and the ultimate result will be a "wry", or crooked foot.

The Care of Unshod Hoofs

The colt should have abundant exercise on dry ground. The hoofs will then wear gradually, and it will only be necessary from time to time to



A SECTIONAL VIEW OF THE HORSE'S FOOT

- | | | |
|--------------------------|------------------------------------|-----------------------------------|
| 1—Cannon bone. | 12—Periople. | 21—Fetlock joint. |
| 2—Capsular ligament. | 13—Os pedis. | 22—Ergot. |
| 3—Extensor pedis tendon. | 14—Sensitive laminae. | 23—Flexor pedis perforans tendon. |
| 4—Articular cartilage. | 15—Horny wall. | 24—Pastern joint. |
| 5—Os sufraginis. | 16—Sensitive sole. | 25—Plantar cushion. |
| 6—Skin. | 17—Horny sole. | 26—Os navicularis. |
| 7—Os coronae. | 18—White line. | 27—Sensitave frog. |
| 8—Periople ring. | 19—Sesamoidian ligaments. | 28—Horny frog. |
| 9—Coronary band. | 20—Flexor pedis perforatus tendon. | |
| 10—Coffin joint. | | |

regulate any uneven wear with the rasp and to round off the sharp edge about the toe in order to prevent breaking away of the wall. Colts in the stable cannot wear down their hoofs, so that every four to five weeks they should be rasped down and the lower edge of the wall well rounded to prevent chipping. The soles and clefts of the frog should be picked out every few days and the entire hoof washed clean. Plenty of clean straw litter should be provided. Hoofs that are becoming "awry" should have the wall shortened in such a manner as to straighten the foot-axis. This will ultimately produce a good hoof and will improve the position of the limb.

Raising and holding the feet of

the horse to be shod, can always be done without much trouble if the horse has been accustomed to it from early colthood. Certain rules governing the manner of taking hold of the feet, and of afterwards manipulating them, are of value.

A shoer should never grasp a foot suddenly, or with both hands. The horse should first be prepared for this act. First, see that the horse stands in such a position that he can bear his weight comfortably upon three legs. This is well worth noticing and if the horse does not volun-

tarily assume such an easy position move him gently until his feet are well under his body.

If the shoer, for example, wishes to raise the left fore foot for inspection, he stands on the left side facing the animal, speaks quietly to him, places the palm of the right hand flat upon the animal's shoulder, and, at the same time, with the left hand strokes the limb downward to the cannon and seizes the cannon from in front. With the right hand he now gently presses the horse towards the opposite side, and the foot becoming loose as the weight is shifted upon the other leg, he lifts it from the ground. The right hand now grasps the pastern from the inside followed by the left hand upon



the inside and the right hand on the outside; then, turning partly to the right, the holder supports the horse's leg upon his left leg, in which position he should always stand as quietly and firmly as possible. If, now, the shoer desires to have both hands free to work upon the hoof, he grasps the toe with the left hand in such a manner that it rests firmly in the palm while the four fingers are closely applied to the wall of the toe, takes a half step toward the rear, passes the hoof behind his left knee into his right hand which has been passed backward between his knees to receive it, and drawing the hoof forward outward and upward supports it firmly on his two knees—the legs just above the knees being applied tightly against the pastern. The forefoot should not be raised higher than the knee, nor the hind

less methods avail much more. In dealing with young horses the feet should not be kept lifted too long; let them down from time to time. In old and stiff horses the feet should not be lifted too high, especially in the beginning of the shoeing. (To be Continued.)

The Bar Shoe and Contraction

OTTO A. WAGNER

There seems to be some difference of opinion on the use of the bar shoe for the cure of contraction. Some hold the opinion of the writer that the bar shoe is the proper shoe for such a condition while a few hold the opinion that it is not.

To get at this matter properly we must consider the anatomy and construction of the horse's foot. Nature

dry out. The result is contraction causing congestion and lameness, hence the demand for a cure.

The cure I think is to replace as near as possible that condition which has been lost. This I think is best done by the use of a properly fitted and applied bar shoe, with pad and pack if necessary, to produce an even pressure on the inner parts of the foot. Of course, the walls of the hoof must be trimmed slightly concave and the shoe shaped convex at the heel so as to spread the hoof. For this reason we need a bar to support the sides of the shoe against this strain. The shoe must spread the hoof, the hoof will not spread the shoe. The bar on the shoe, I think, is indispensable.

Holding the Horse's Foot While Shoeing Him

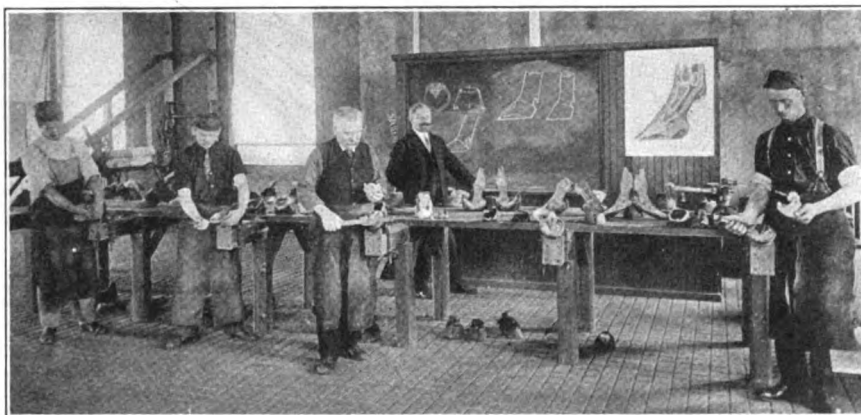
A. T. SMITH

One of the readers of "Our Journal" has inquired for an appliance which I shall attempt to describe for shoeing horses suffering from cramps or string halt. The device which I shall attempt to describe and to illustrate is suitable for horses afflicted with cramps or string halt and is also excellent for holding kicking horses without danger to the shoer. The tackle consists of a $\frac{3}{4}$ -inch hemp rope about 20 feet long, two rings made of $\frac{7}{16}$ inch stock and about two inches in diameter and a leather ankle strap. One ring is fastened to the end of the rope, preferably with the aid of a thimble so as to prevent undue wearing of the rope. The ankle strap should be made from a piece of good stout heavy leather and if the strap is well padded, it will work better and with less danger to the horse.

When ready to apply this tackle to an animal, place the ankle strap around the horse's foot just below the fetlock with one ring on the strap. Now fasten the ring end of the rope about the animal's tail as shown in the engraving and string the free end of the rope through the ring on the ankle strap and then through the other ring which is fastened on the other end of the rope.

A strong steady pull will now raise the animal's foot to the desired position for shoeing and hold it there for just as long as you desire.

In making this tackle, see that both the rope and the ankle strap are of good sound material so as to run no risk from breakage. The breaking of either the rope or the ankle strap may result in injury to



SHOEING STUDENTS TRIMMING SPECIMENS. THE FEET ARE HELD BY A DEVICE WHICH PERMITS THEIR BEING HELD IN ANY POSITION

foot higher than the hock, nor either foot be drawn too far backward.

In lifting the left hind foot the animal should be gently stroked back as far as the angle of the hip, against which the left hand is placed for support, while the right hand strokes the limb down to the middle of the cannon, which it grasps from behind while the left hand presses the animal's weight over towards the right side, the right hand loosens the foot and carries it forward and outward from the body so that the limb is bent at the hock. The holder then turns his body towards the right, brings his left leg against the anterior surface of the fetlock-joint, and carries the foot backward. If the right foot is to be raised, the process is simply reversed. In raising the feet no unnecessary pain should be inflicted by pinching, squeezing, or lifting a limb too high. The wise shoer avoids all unnecessary clamor and disturbance; quiet, rapid, pain-

has placed every part of the hoof there for a purpose and adapted the foot in general to the conditions which the horse encounters in its wild state.

In its natural state the horse travels on sod and soft soil seldom encountering stones. But in the domestic state the horse is forced to travel on all sorts of surfaces, from grass to concrete and cobblestone. The wear on the hoof is great and shoeing becomes necessary and then our trouble starts. On the sod the foot gets an even pressure and all is well, but when we shoe to prevent wear we get most or all of the pressure on the wall or outside of the hoof by the use of thick shoes and high calks, which relieves the sole and frog of the pressure that it should naturally have. This together with improperly fitted shoes and too much trimming on the sole and frog and too much rasping on the side walls cause the hoofs to weaken and



the shoer, especially if the device is applied to a vicious animal.

This same tackle can be applied to a front foot with the aid of a stout surcingle.

Veterinary Notes for the Horseshoer

Conducted by DR. POWELL of Considine and Powell, Cleveland, Ohio
Sand Cracks.

A sand crack is a fissure or crack in the horn of the foot, occurring usually in the wall; and as a general rule follows the direction of the horny fibers. They may occur on any part of the wall, but are usually seen in front, where they are called "toe-cracks" or on the quarters, where they are called "quarter-cracks."

Toe-cracks are most commonly seen in the hind feet and the quarter cracks in the fore feet, but this is not always true. The inside quarter is more often affected, on account of being thinner and because during locomotion it receives the greater part of the weight of the body. These cracks are the most serious when they are complete, that is extending from the coronary band at the top, to the bottom of the wall and affecting the fleshy layer under the horn.

Causes.—Injuries to the coronary band are very often the cause of sand cracks, especially when the horn is hard and dry. Excessive dryness as well as alternate changes from damp to dry very commonly cause this condition. Animals running at pasture when transferred to stables with hard dry floors are liable to quarter cracks.

Fast work on hard roads, blows on coronet, and heavy pulling on slippery streets must be considered as common causes.

Improper shoeing, such as setting

the nails too far back toward the heels, using large nails and heavy shoes, all tend to cause this condition.

Such disease as Canker, Suppurative Corns, Quittors, etc., as well as contracted heels are common predisposing causes.

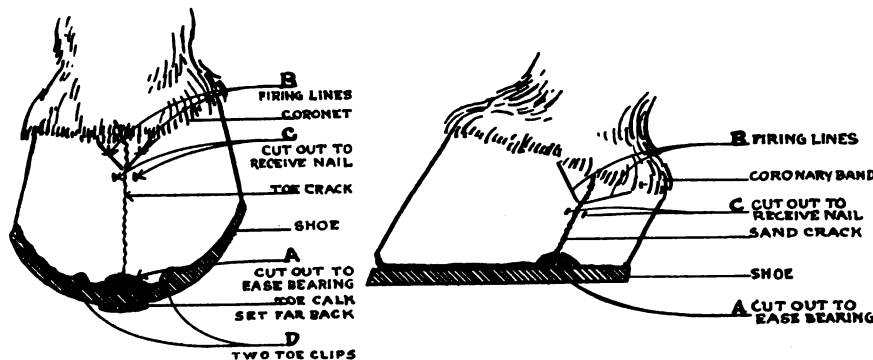
Sand cracks are rarely seen in the sole and when found are caused by an injury, such as a cut from a sharp stone, glass, etc.

Symptoms.—The positive diagnostic symptom is a fissure or crack in

Lameness may be present in severe cases and lameness is more pronounced the faster the animal is driven and especially when going down hill.

The fissure may remain dry in some cases, in others there may be a hemorrhage and in still others there may be a thin, offensive discharge or a fungus like growth protruding from the narrow opening.

Treatment.—The feet of an animal that is subject to sand cracks should be maintained as near a normal con-



DR. POWELL TELLS ABOUT TREATING TOE CRACKS AND QUARTER CRACKS

the wall of the foot; however, this may be easily overlooked especially when the crack is just commencing at the coronary margin or are covered accidentally or purposely from view by mud, hoof ointments, tar, putty, etc.

In some cases the whole thickness of the wall may be involved with the exception of a thin layer of horn on the outside called the "Periople" and when this condition is present the crack can be suspected by a depression of the periople beginning at the coronary band and running with the horn fiber, but a positive diagnosis can only be made by paring away this thin layer and exposing the crack to view.

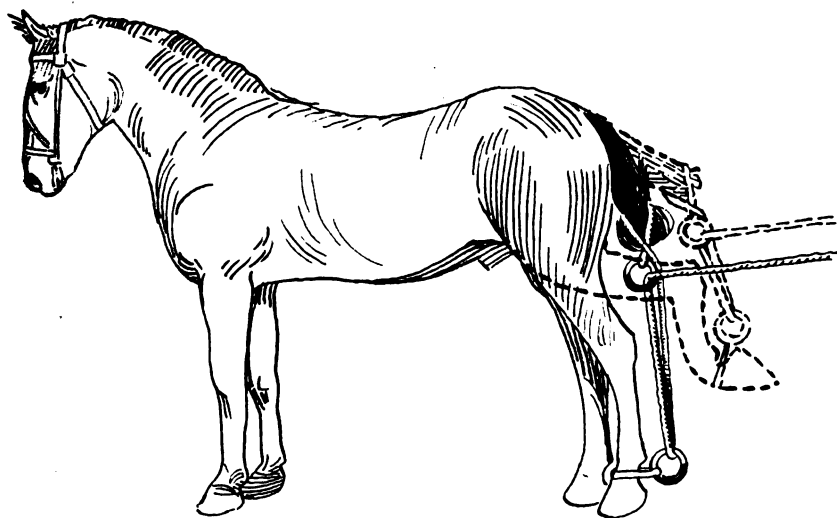
dition by the use of hoof ointments, damp floors, bedding, etc., as possible. The shoeing must be very carefully attended to, by using proper weight shoes, nails not too large and not driven too near the heels.

After the cracks have made their appearance, to have a successful issue in the treatment, all motion of the edges of the cracks must be arrested, and this is usually accomplished by a nail, V-shaped burns and "Easing" surface by cutting away horn at bottom of the wall directly below crack (See A in cut). A V-shaped burn should be made through the wall, so it is completely separated from the other horn of the hoof (As shown in figure at B). A nail should be driven through the horn after being cut out as at C. The nail must be clinched to hold edges of the crack from moving.

In toe cracks there should be two toe clips on the shoe, one on each side of crack to help hold edges from moving. The toe calk should be placed as far toward the heel as possible so the animal will break over quickly.

A good ointment should be used to soften the hoof and a blister applied to the coronet to stimulate the growth of the horn.

A good cement can be made of the following to put in sand cracks, to keep out dirt and infection: Take two parts of gutta-percha and one part of coarsely-powdered gum-ammoniac, place in a tin-lined vessel



HOLDING THE HORSE'S FOOT WHILE SHOEING HIM



over a slow fire and stir continuously until thoroughly mixed. This cement can be kept for years and when required cut off a sufficient quantity and melt immediately before application. The crack or fissure must be dry and clean when the cement is applied.

When infection is present the horn should be cut away to give drainage and a good antiseptic used such as Bichloride of Mercury in solution 1 to 1,000.

If a tumor-like growth protrudes through the narrow opening it must be removed by the use of a knife. This growth develops on the inside of the hoof and may involve other structures of the foot in disease so the removal of this should only be undertaken by a skilled veterinarian.

Shoeing to Correct Front Interfering

RALPH ATKINS.
(*Juniata News*)

One of the hardest faults to correct that the horse shoer has to contend with is that of front interfering.

To begin with, the horse in such cases has a crooked pair of feet, and



FIG. 1.—A PAIR OF CROOKED FEET

in the majority of instances, a crooked pair of legs that are set close together, or as the saying goes "coming out of one hole".

Every bit of skill the shoer possesses must be utilized if the result to be desired is accomplished. First of all, the foot must be perfectly leveled, and in the major number of horses afflicted, it has been the writer's experience that the foot is high-est on the outside.

When the foot is as nearly level as it can be made, it is the writer's practice to apply such a style of shoe as is best suited to the individual case. Sometimes a bar shoe gives excellent results as it can be built up on the inside quarter and thus distribute the bearing as in no other way. Again, the writer uses a spur on the outside providing the break is there, always having in mind that the foot must break square, unless this is done, trouble will surely follow.

In fitting the shoe, take a nice bevel off the face inside, fit close and smooth, and in the majority of cases, the interfering ceases. It should be borne in mind, however, that the foot must be level.

Leveling is an art that a great deal could be written about; in fact it is the foundation of horseshoeing.

In all his experience the writer never worked on any feet that were as crooked as the pair illustrated. When the horse came to the shop for treatment the ankles were raw and swollen and hand banged against the knee, the bunch noticeable in the illustration was as big as an egg. To say the least, it was a forlorn hope, but the owner wanted the writer to try to do something and stated that two or three other attempts elsewhere had failed to accomplish any benefit. It was found that the feet were about $\frac{5}{8}$ of an inch high on the outside. Not much could be gotten off as the feet had been cut too far already.

A pair of bar shoes were put on with toe calks extended, which helped the case to a large extent. During second shoeing it was possible to take a nice cut off the outside and nearer getting the foot to hang in line with the legs, but not as level as should be. The bar shoe was used again with extended heel calk as well as toe calk, and the horse has not hit the ankles a dozen times since. The horse works on a plumber's wagon every day and wears out two sets of shoes each month. The writer does not guarantee this way of shoeing to apply to all cases, but it fitted this instance.

In regard to all front interferences, the writer's experience has been that all or nearly all ankle

hitters are high on outside and the only cure is to get the foot to hang in line with the leg. If you can't get the foot to break square, put a spur where the foot breaks over. The writer never uses side weights now, he did at one time but learned better.

To give the readers of this article an idea of how the shoe looked that was used on this unusual case a sketch is shown.

Anti-slipping Devices and Slippery Pavements

Considerable space has been devoted recently to a discussion of horses on slippery pavements in one

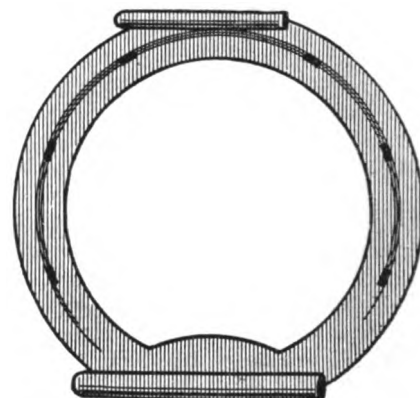


FIG. 2.—THE STYLE OF SHOE USED ON ANIMAL PICTURED IN FIG. 1

of the big newspapers of New York City. A number of persons thinking themselves qualified to speak on the subject have aired their views on the matter of sharp calks, chains, bur-lap, ashes and various other means and devices calculated to keep the horse on his feet when pavements are slippery and covered with ice.

This discussion on this subject was provoked by the proposal of the New York City Fathers to pass an ordinance that all horses be sharp shod in winter. Here is an extract from one item published. It places the rubber pad above everything else as an anti-slipping device.

William Bradley, who has sometimes worked as many as a thousand heavy draught horses on various contracts in and about New York, never puts a sharp calk on any of his horses in any kind of weather for any kind of work.

"Sharp calks would do more harm than good," he said the other day to a reporter of the Herald. "I have tried them, and I found that our horses were all cut up after we had used them a short time. There is much the same objection to chains for heavy hauling. They will keep a horse from slipping all right, but they are heavy and they tire a horse out in a short time. When he gets tired he begins to interfere and cuts and bruises himself as badly as with sharp calks."

"How do you shoe your horses to keep



them on their feet in winter on the asphalt pavements?" Mr. Bradley was asked.

"As soon as the first snowstorm of the winter comes along," he answered, "we put rubber pads on all our horses, and we keep pads on them until spring. They are not perfect, but they are the best thing yet invented for the purpose, to my way of thinking. A careful driver very seldom has a horse down if the animal is fitted out with pads. On very bad, slippery days we have our shoeing smiths pull the old nail in our horses' shoes and put in sharp headed frost nails in their place. These help a great deal while they last, and there is no danger of cutting up the horse that wears them, but they last only one day. If the bad weather continues you must renew the nails every day. It takes only a few minutes, however, to fix a horse in this way, and it pays, to say nothing about being fair to the horse."

The Gates to Chirk Castle, England

JOHN J. DUNLOP

The engraving shown as the frontispiece on page 184 pictures an exceptional example of the blacksmith's art. The entire structure has an appearance of beauty and grandeur that is seldom seen. The composition and workmanship displayed are excellent.

As may be seen, a large metal pillar supports the gate way on each side, and beside each pillar is a fixed or stationary grille.

The railing of the castle extends all along the front and is fixed to a lime stone parapet. The vertical bars of the railing part are seven-eighth of an inch square and are riveted on to a rectangular rail at the bottom with a moulded rail at the top. Every tenth baluster is turned on the top end and extends above the moulded horizontal bar. On the top the railing is finished with a series of large scrolls welded together and rivetted to the moulded rail. Immediately on the top of the stone cope and between the main balusters are fixed ornamental spikes about twelve inches high. These are finished with a stamped shaped end while at the middle and lower end the scrolls are united by a band.

The fixed grille at each side of the gate way extends to a height of ten feet and is divided into a series of panels by plain and ornamental scroll work. The intermediate spikes on the lower portion are much longer than those on the railing having two single scrolls on each side in place of one. The horizontal and vertical panels are filled entirely with scrolls welded together and connected to the sides by rivetting with ornamen-

tal band attachments at the central horizontal junctions. While overhead the grille is built on a central stem with scroll and leaf ornament on each side.

The iron pillars on each side are constructed entirely of hammered iron. They have a heavy moulded base on to which is set a series of moulded balusters. Above that there is a sub-base which is equally handsomely moulded and that in turn receives the stems of the upper part of the metal work. The upper panel is carried upwards to meet the frieze

springing from a common centre. Overhead we have a greater display of the same ornament while an enamelled shield, displays the heraldry of the owner.

Equally rich scroll work is displayed on each side of the centre of the grille. This is one of the magnificent specimens of ironwork in England which is to be seen today. No doubt the design would be costly but it is full of nobility and grandeur and will have been executed by a smith filled with emulation and pride of craft.



—From Youngstown (Ohio) Telegram.

"GUESS SOME FOLKS'LL HAVE TO GO BACK TO THE HORSE"

tal. Where we have a fine display of stamped acanthus leaf ornament which forms the frieze. The cornice and capping of those massive pillars are formed in one piece.

It is in the central grille with its double folding gates that we have a remarkable example of the smith art. The design of this part of the gate must have presented the greatest difficulty to the smith. The meeting of the two gates is covered with a moulded cover plate. In the center of each gate is a vertical panel which is partly filled with vigorous growing leaves. This is flanked with a design of scroll work which is closely set with leaves and tendrils all

Protection Against a Partner

Here is a man who is certainly taking an unusual precaution. I observe that if it had been taken oftener there would be fewer mis-mated partnerships:

Utica, N. Y.

I have read a number of articles on partnership law, some of yours among them, and as I am about to take a partner into my business for the first time in my life, I wish to ask you a question about the matter. I understand that when a partner acts his fellow-partner is bound, and the danger is that the fellow-partner may in that way be compelled to stand for things, and perhaps for monetary losses, which he would wish to escape. I have known of cases myself where a fellow-partner has been betrayed and sometimes



robbed by his partner, and what I wish is some knowledge which will put me where I can guard against anything of this sort. I have every confidence in the man I am taking in, but of course I do not know how he will act when raised to a partner. Do you believe in taking partners as a general proposition?

As to whether I believe in taking a partner, I answer that I do only when new capital is needed, and the only way to get it is to take a partner. As a rule the owner of a business which is so good that somebody is willing to pay money for a share in it, can get his new capital from his bank. He does not need to sell part of his business.

If what is wanted is not more capital, but somebody to do part of the executive work, I should never go to the length of taking a partner just for that. I should hunt up somebody and hire him, insuring his personal interest by giving him an interest in the profits.

I have seen so many partnerships break on the rocks of controversy and litigation that it has made me very skeptical about partnership as a general proposition. It is almost as much of a lottery as marriage. The trouble is that partnership is based on the law of agency. Each partner is the agent of all the others, and binds all the others. It follows that there are so many ways in which one partner can be betrayed by another, either through ignorance, bad judgment or positive dishonesty, that every day that he lives with a partner he is taking a dozen chances. Of course, there are partnerships that are perfectly successful—thousands of them—but sometimes I think that partnerships in which all partners are satisfied and contented, are in a very small minority.

The above correspondent asks how he shall protect himself from being betrayed into anything by the partner he is about to take. It occurs to me that a man about whom one feels like taking a precaution like this, should not be taken as a partner at all. However, I should not intrude my personal opinions on that phase of the matter. I will do what I can to answer this correspondent's question.

Generally speaking, anything that one partner does, in the ordinary course of business and within the scope of it, will bind the firm. It will bind the firm even though the partner who does it has been positively told by his fellow-partners not to do it. A partner has a very wide latitude under the law. I cannot, of course, go into the whole question of

partnership law here, but broadly speaking, the chief things for one partner to watch, in connection with his fellow-partner, are as follows:

First.—The question of drawing checks against the partnership funds. One partner can usually draw a check in the firm name or endorse checks payable to the firm. The only way to absolutely safeguard this is to have both partners sign or countersign the checks.

Second.—The question of pledging the firm's credit. One partner has an almost unlimited right to pledge the firm's credit for the purposes of the business. Many a firm has had its back broken by being made to take on obligations, through the act

without turning it into the firm, the bill is nevertheless paid. In one case, a customer of a partnership, desiring to pay a large account, left a check for considerably more than the account with the firm, with instructions to put it through, retain enough to pay the account and send him a check for the difference. This was done, except as to the latter part of it. One of the firm used the balance of the money for his own purposes. The firm had to make it good.

Sixth.—The question of a partner's judgment. Where a member of a partnership impulsively or ill advisedly does something which gives somebody an action in damages, the firm will have to pay those damages if any are recovered. For instance, if one partner makes a defamatory statement about somebody in connection with the business, and that somebody sues, the firm will be responsible. If a partner brings malicious prosecution against somebody, on behalf of the business; or issues an improper attachment, or violates any law relating to the business, and as a result a penalty has to be paid, the firm will have to pay it.

I should emphasize that all these things must be done in connection with the business in order to bind the firm. If they are outside the scope of the business the only one bound is the partner doing them. For instance, if a partner signs the firm name to an accommodation note, the firm is not liable, for the giving of accommodation notes is not a part of the ordinary business.

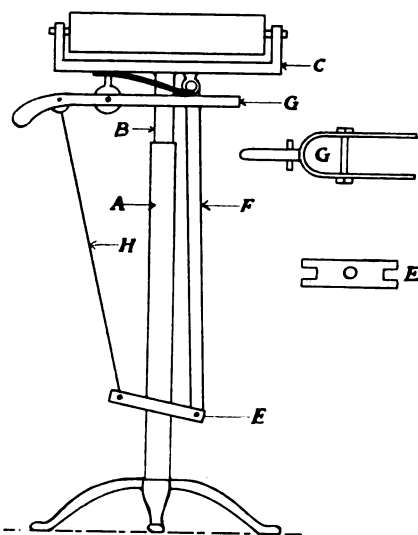
(Copyright by Elton J. Buckley.)

An Improved Shop Helper

OTTO A. WAGNER

The accompanying engraving shows a very practical helper that I made and have used for several years. I think it beats anything of its kind that I have ever seen, as it is easily and quickly adjusted with one hand and does away with the thumb screws which are usually found on a device of this kind.

The base of the stand is made of an old reel spider from a Deering binder. Into the bore of the spider, a piece of $\frac{3}{4}$ inch iron pipe, 20 inches long is screwed and fastened. A piece of $\frac{3}{4}$ inch rod of suitable length is used to slide into the pipe. On the upper end of this is fastened the holder or the roller support upon which long pieces of stock are supported. The head on the top end of rod B is so arranged that the weight



AN IMPROVED SHOP HELPER

of one partner, which it should never have taken on.

Third.—The question of making promissory notes in the firm's name. Generally speaking a partner can sign the firm name to a note and bind the partnership.

Fourth.—The question of mortgaging the firm's personal property to raise money. In States where chattel mortgages are possible, one partner can usually make a mortgage in the firm name on its personal property.

Fifth.—The question of a partner's honesty of business dealing. In many cases a partnership is liable for the fraud of one member in connection with the business, even though no one knew about it or was in sympathy with it, and even though the partner who perpetrated the fraud had been expressly forbidden to do it.

An example is the misappropriation of somebody's money. If A, a customer of B & Co., pays a bill to B, and B absconds with the money,

rests on the rod F, which in turn forces down one end of the piece E which holds the roller at any desired height. Piece E is made of 1 by 1½ inch steel in which a suitable hole has been drilled in order to allow the piece to fit easily over the pipe. This piece locks on the pipe when the weight of the stock on the roller forces down one end of it. The piece E is operated for adjusting the various heights by means of the small rod H which connects with the finger lever G. This is a forked lever placed just under the head and is operated by a spring as shown in the engraving.

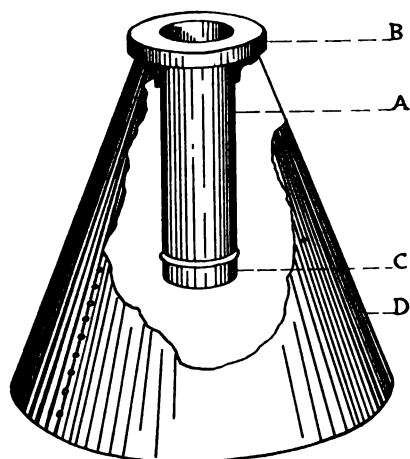
Nickel Silver Plating Outfit

R. S. MATZEN

This little outfit is one the writer made some time ago, to plate my own small tools with, but since making it, it has proven the best money-maker I have in the shop. It has cleared over \$320.00 in the last year, yet it cost less than one dollar to make.

To make it, get a piece of three-inch gas pipe, nine inches long, A, and thread each end. On the bottom end screw an ordinary cap, C, as shown and on the top a flange, B.

Now, get a piece of sheet iron 1/64-inch thick and cut it out so as to make a cone, 3½-inches in diameter at the top and nine inches in diameter at the bottom, D. Rivet it up as shown. Now put the crucible,



THIS LITTLE DEVICE HAS PROVED A MONEY MAKER

A, in it. The flange will rest at the top of the cone as shown in the illustration.

Now get some of the royal silver plating metal, enough to fill the crucible. This metal may be had from several manufacturers. Or it may be made by melting two ounces of antimony, two ounces of bismuth and five pounds of pure block tin to-

gether. However, the metals made by the manufacturers are much better are uniform, and cost but little more than to make yourself.

As soon as the metal is melted, let it get hot enough to slightly scorch a piece of paper. Then put in about a teaspoonful of platers fluxene. This may be had from any dealer in platers supplies. Now get two glass or porcelain jars about four inches in diameter and eight inches high. In one put a mixture of one part sulphuric acid to five parts water. In mixing this always add the acid very slowly to the water. In the other jar put a solution of sal ammoniac dissolved in water. Dissolve all the sal ammoniac that the water will take. Then to each quart of this solution, add a tablespoonful of fluxene.

To use the outfit, take the article to be plated and fasten a copper wire to it, and dip it into the jar containing the acid solution: Then take it out and dip in the sal ammonia fluxene solution, and then let it dry, being careful not to touch it with greasy hands or to allow any grease to get on it. After it is dried, have the metal heated. Then throw a little of the fluxene in the crucible, and dip the article in the melted metal, leaving it for about one or two minutes. Then, have another jar ready, filled with cold water in which two tablespoonfuls of fluxene has been added to each quart. As soon as the article is taken from the metal, it is plunged in the cold fluxene solution, which contracts the plate on the article, making it adhere. The articles are then placed in a box of warm sawdust till dry. Wipe off with a piece of tissue paper, which leaves a shining silvery plate that will hold and wear well.

The following scale of prices are about what can be charged:

Small bicycle or motorcycle parts, 15 to 40 cents each.

Table knives, per set of six, 25 cents.

Table forks, per set of six, 25 cents.

Table spoons, per set of three, 25 cents.

Tea spoons, set of six, 25 cents.

Revolvers, each, 50 cents to \$1.00.

Gun parts, 10 cents to \$1.00.

Pliers, pincers, wrenches, etc., 10 cents to 75 cents.

Other articles in proportion.

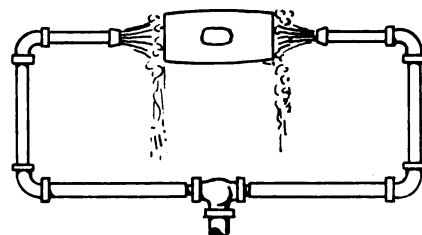
At these prices, it is practically an all-profit game, as a pound of metal costing 75 cents will do about \$15.00 worth of work.

I forgot to mention how I heated the plater. I use a little single burner gasoline stove. However, any means of heating the crucible can be employed; though a gas or gasoline stove will perhaps be found most convenient.

A Simple Method of Hardening Sledges

J. W. HEPPLEWHITE

The accompanying illustration shows a simple device which I use for hardening sledges. As may be seen, the device is an arrangement of piping designed to flow two streams of water at the same time upon the faces of the sledge head. I use a ¾ inch pipe with four L's and one T. The pipe is brought up to a convenient height over the hardening tank where the T branch



A SIMPLE METHOD OF HARDENING SLEDGES

divides the piping so as to run to the right and left as shown then up and back with a convenient opening left in the direct line of the pipe, each end being capped with a suitable pipe cap, having a half inch hold drilled in its center.

When ready to quench a sledge head, the head is placed between the two ends of the piping and the streams of water allowed to run on the opposing faces of the sledge from where it drains into the quench tank. In hardening sledges, I do not draw the temper unless I get too much water on the faces of the sledge being quenched.

This simple device can be arranged by any practical workman and for the man who has any considerable amount of sledge and hammer head hardening to do, he will find it a time saver and also reliable. By connecting an extra valve into one side of the piping, this same device can be used on single faced hammers.

Thoughts on Timely Topics

BY THORNTON

Caustic Censure and Cheery Comment

PREPAREDNESS OR UNPREPAREDNESS—it makes no difference what your sentiments are, don't think that soldiers and sailors, horses and cannons, battleships and submarines constitute all there is to preparedness. A leather apron, a forge and an anvil doesn't make a smith. Nor does a hoof knife, a rasp and a shoeing hammer make a horseshoer. You've got to go back farther than



that. A lathe, a wheel puller and a tire tool doesn't qualify you to do expert auto repairing. You got to get more than that. Preparedness in any line whether for war, for business, for profits or for your meals must start back farther than merely the external evidences. Preparedness for war (we mean real efficient preparedness) means not alone trained men, with proper equipment, efficient machinery and sufficient ammunition, but it means all that is back of that external show of preparedness. It means prepared factories, railroads, transports, nurses, medical equipment, automobiles, food, gasoline, and the hundreds and tens of hundreds of things that make for the real preparedness of the army and the navy in the field and on the sea.

Preparedness in business doesn't mean merely a shop and an equipment. It means knowledge, experience and ability.

Don't look upon preparedness merely as the external evidence that you can see with the casual eye. Look for real preparedness back behind the soldier and marine. What is there to back up his well-known and gladly acknowledged bravery? Bravery backed by inefficient guns, shooting rotten powder is foolhardiness.

And the finest smith shop equipment on earth becomes a joke in the hand of a man untutored and unacquainted with smithing practices and experiences.

AS I WAS WATCHING THE AUTOS whizz by on Sunday, I got to wondering how many smiths there were who still insist that the auto cannot affect the horse and horse vehicle field. Of course, I hear of more and more smiths taking up automobile repairing, but why in name of common sense they don't get to it quicker is more than I can figure. There will be horses for sometime to come, but the auto and gas tractor is going to make a serious difference with the "hay motor" and its use. The gas tractor is just beginning to get a start. When it finds itself and is perfected for the varied duties expected of it, then will it multiply as the seed of the potato, yea, even as the dandelion. There is need for sound, serious thinking on the auto and tractor situation. It cannot be decided by straddling a cracker box and trying to fill a mongrel hand to a straight flush. Nor can it be decided on the outcome of a checker game. Put real grey matter into the problem and you'll get real infor-

mation out of your consideration of the situation.

HERE'S A SUGGESTION: Find out how many autos and tractors there are in your neighborhood or in the vicinity from which you draw your trade. You can get this information from auto dealers and from customers. Ask the auto dealers how many machines they expect to sell this season. Then look into the gas tractor situation in the same way. Now what facilities are offered in this territory for the repair of autos and tractors? What can you offer auto owners that the garage cannot offer. Consider this to those owners of autos who are your customers you should have first consideration—and you'll get it if you will do auto repairing.

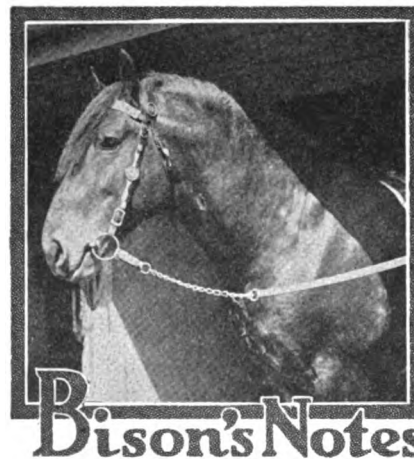
Air Drill Does Duty as Power Hammer in Blacksmith Shop

WALTER BAZORE,

(in Engineering Record)

Master Mechanic, Rapid Transit Subway Construction Company, New York City

By removing the rotating pawls and ratchets from the air drill shown in the accompanying engraving and clamping a heavy ram in the drill chuck it was converted into a power hammer for a contractor's blacksmith shop. Before being used for this purpose the drill had been mounted in a frame of steel rods, with its rotation removed and a rod, with a dolly-plate welded to its lower end, inserted in the chuck, and used as an air hammer for driving sheeting.



Peter the Great as a Money Earner—Carl S. Burr and the Trotting Record—The Green Horses That Made Records.

The recent sale of the trotting stallion, Peter The Great, 2:07½, for \$50,000 at 21 years of age, has set horsemen to discussing the chances of the stallion's buyer to make the investment a profitable one. Some assert that the reproductive powers of the average stallion decline so rapidly

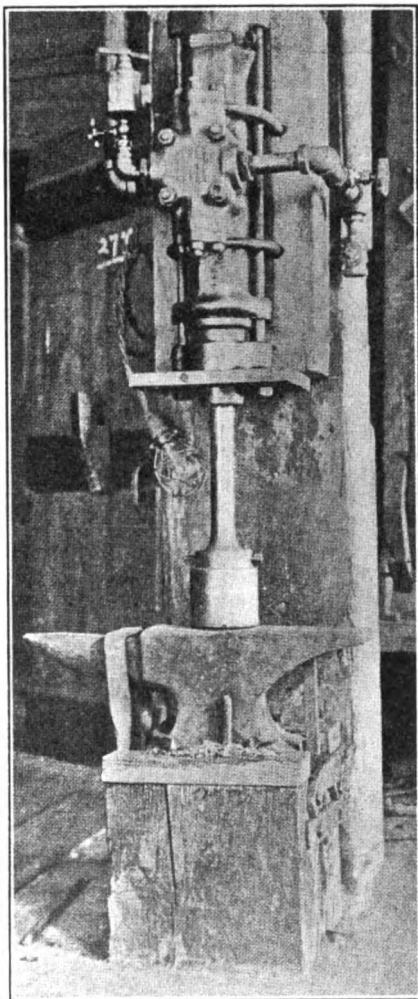
after he is twenty years old that his future in the stud is very problematical. However true this may be of stallions of other breeds, the records show that trotting stallions retain their vigor in a surprising degree, in many instances when well past 25 years. The stallion McKinney, 2:11¼, that was sold for \$50,000 when he was seventeen years old, is still living at 29 years old, performed stud service last season and will be in the stud again this year. There have been many instances where trotting stallions were continued in active and successful stud service after they were 25 years old. The once-noted stallion, Bonnie McGregor, 2:13½, got over 40 foals in his 29th year and at the same age Aladdin, son of Ryedyk's Hambletonian, got 19 foals. If Peter the Great remains a sure foal getter for just two seasons he will prove a profitable investment for, while his service fee, for mares booked to him previous to his sale will be \$400; for others it will be \$1,000. This is getting back to the service fees of the boom times in the late eighties and early nineties when Axtell, Allerton, Arion and one or two other sires stood at a fee of \$1,000, but it is still far below the fee first charged for Arion's services just after he was sold for \$125,000, his fee at that time being \$2,500. The conditions surrounding a stallion in service are vastly different now than they were 25 years ago. Then artificial breeding, while known, was not practiced. Today it is in vogue throughout the breeding world. The syringe was first used as a method of artificial breeding but it has practically been abandoned for the capsule. By means of capsules five or six or even a greater number of mares may be impregnated from one service of a stallion. It has been by the use of capsules that Peter the Great has been enabled to beget such a large number of foals each season and the method has probably conserved his breeding powers greatly. The records showing the mares entered in the greatest of the trotting futurity stakes, the Kentucky Futurity, are not yet available to show the number of mares entered in that event were bred to Peter the Great in 1915. In 1914, however, 61 mares bred to him were named to produce foals in 1915 and probably at least twenty more not named in that futurity were bred to him either naturally or artificially. As having a bearing on Peter the Great's earning capacity in the stud it is interesting to note where the mares bred to him in 1914 were owned. As would be expected, Kentucky leads as it was in that state the horse was kept 43 of the mares being owned there. Pennsylvania breeders sent seven; New York breeders six; Ohio and Massachusetts breeders three each, while Michigan and California breeders sent one each. At a fee of \$400 each Peter the Great's earning capacity would be \$24,400 even if these mares were the only ones bred to him. What he will be able to earn at a fee of \$1,000 is not difficult to comprehend. As indicating the class of mares mated with the famous sire in 1914, it may be of interest to mention some of the more notable ones as follows: Ruth McGregor, 2:07½, by Jay McGregor, 2:07¼; Queen Worthy, 2:07½, by Axworthy, 2:15½; Beloaasia, 2:06¼, by Bingara; Annie Kohl, 2:07½, by Fred Kohl, 2:07¼; Leading Lady, 2:07, by Bingen, 2:06¼; Hawthorne, 2:06¼, by Jay Bird; Patchen Maid, 2:08¼, by Patchen Wilkes; Sue D., 2:08¼, by Todd; Fanny Stanton, 2:10¼, by Bingen, 2:06¼; Hollywood Kate, 2:11¼, by



Joe Dodge; My Gift, 2:11 $\frac{1}{4}$, by Guy Barron; Lizzie A., 2:13 $\frac{3}{4}$, by Alfred G., 2:19 $\frac{1}{4}$; Sarah W., 2:18 $\frac{1}{4}$ (dam of Joan, 2:04 $\frac{1}{4}$), by Hal Braden, 2:08 $\frac{1}{2}$; Burma Girl, 2:15 $\frac{1}{4}$, by Bingen, 2:06 $\frac{1}{4}$; Carrie Worthy, 2:18 $\frac{1}{2}$, by Axworthy, 2:15 $\frac{1}{2}$; Carrietta, 2:18 (dam of Silent Brigade, 2:10 $\frac{1}{4}$) by Directman; Dorothy Axworthy, 2:21 $\frac{1}{4}$, by Axworthy, 2:15 $\frac{1}{2}$; Sarah Leyburn, 2:20 $\frac{1}{2}$, by Onward, 2:25 $\frac{1}{4}$; Adivo, 2:20 (dam of Harry Dillon, 2:10) by Guy Wilkes, 2:15 $\frac{1}{4}$; Cocoa, 2:21 $\frac{1}{4}$, by Arion, 2:07 $\frac{1}{4}$; Nell Worthy, 2:22 (dam of Worthy Prince, 2:11 $\frac{1}{4}$) by Axworthy, 2:15 $\frac{1}{2}$; Voria Worthy, 2:22, by Axworthy, 2:15 $\frac{1}{2}$; Delagoa (dam of Melva J., 2:10 $\frac{1}{2}$) by Arion, 2:07 $\frac{1}{4}$; Baron Lassie (dam of Peter Billiken, 2:07 $\frac{1}{4}$) by Baron Wilkes, 2:18; Harvest Girl (sister to The Harvester, 2:01), by Walnut Hall, 2:08 $\frac{1}{4}$. It is very probable that no other sire has ever been mated with a greater lot of mares and Peter the Great's bookings last year included even more of the same sort. Last season 56 of his get entered the list of standard performers a larger number of new ones than ever represented a sire in one season before and 10 of his get entered the 2:10 list, giving him a total of 40, of which number 35 are trotters, a vastly larger number than any other sire, living or dead, has in that list. As each crop of his foals comes from better mares than the preceding one, it is not rash to predict that Peter the Great's fame as a sire has not come anywhere near reaching the point it will eventually reach.

The veteran horseman, Carll S. Burr, who died a few days ago at his home in Commack, Long Island, was the first man to drive a three-year-old trotter to a record as fast as three minutes for the mile. To present day horsemen a three-minute three-year-old would not be regarded as even good road-horse material, for today the three-year-old record is 2:03 $\frac{1}{2}$. There are very few horsemen living today that can remember when Mr. Burr drove the first three-year-old to a record below three minutes, although one of the men who acted as a judge on that occasion is still living, Mr. C. N. Lawrence, of New York City, then and ever since a devoted lover of the trotter. It was in the month of October, 1858, that Mr. Burr set the colt-speed ball rolling on its way towards a two-minute three-year-old trotter and he lived to see a trotter of that age come within three and one-half seconds of that mark. The three-year-old Mr. Burr drove that afternoon so long ago, was a filly called Lady Emma and a curious thing in connection with the performance was that Lady Emma's sire, Jupiter, was a son of Long Island Black Hawk, whose dam, Sally Miller, took a three-year-old record of 3:04 in Philadelphia in 1828, her record remaining the fastest for the age until it in a race of a single one mile heat over the old Centerville race course on Long Island, for a purse of \$100. Several other three-year-olds started but she won by ten or twelve lengths in 2:50, trotting the was lowered by her great granddaughter in 1858. Lady Emma's record was made first half of the mile in 1:19, which was regarded as wonderful at that time as a half mile in one minute by a three-year-old would be regarded today. Up to the time of Lady Emma's performance few three-year-olds had been trained, nearly all horsemen being of the belief that it was suicidal to train colts of that age; most trotters of that day never felt the weight of a harness until they were four or five years old. Lady Emma, however,

went on and developed into one of the best aged trotters of her time, and six years later, with Flora Temple retired she was the mistress of the trotting turf, defeating the two then-famous stallions, George Wilkes and Gen. Butler, in a series of match races to wagon. In those days most races were to wagon and it was to that hitch that Lady Emma scored her fastest record, 2:26 $\frac{1}{2}$. From the time Lady Emma made her three-year-old record in 1858 can be dated the wonderful advance in colt speed. Two years, later over the old Woodlawn track at Louisville, Ky.,



AN AIR DRILL AS A BLACKSMITH'S HAMMER

Lady Emma's three-year-old record was twice beaten. Elvira Whitesides, a filly of unknown breeding, won a heat of a race in 2:39 and Cora, by Neaves' Cassius M. Clay, Jr., won the next two heats in 2:37 $\frac{1}{4}$ and 2:42. Cora's record stood until nine years later, 1869, when during the October fair at Lexington, the three-year-old colt, Blackwood, by Alexander's Norman, trotted in 2:31 and upon the strength of this performance, the breeder of the colt, who had given a half-interest in him to his trainer, bought it back for \$12,500 and a little later sold the colt to Harrison Durkee, of New York, for \$40,000. The next sensational three-year-old to appear was the filly, Lady Stout, by Mambrino Patchen. She trotted two heats in 2:30 $\frac{1}{4}$ and 2:29 at Lexington, Ky., in 1874, and was sold to Robert Bonner, of New York, for a long price. The first three-year-old

had now beaten 2:30 and from her time on the reduction of the age record was rapid, the reductions and colt trotters taking part in it being as follows: 1877—Elaine, 2:28, by Messenger Duroc; 1879—Steinway, 2:25 $\frac{1}{4}$, by Strathmore; 1879—Jewett, 2:23 $\frac{1}{2}$, by Allie West; 1881—Phil Thompson, 2:21, by Red Wilkes; 1883—Hinda Rose, 2:19 $\frac{1}{2}$, by Electioneer; 1885—Patron, 2:19 $\frac{1}{2}$, by Panoaat; 1887—Sabee Wilkes, 2:18, by Guy Wilkes; 1889—Ax-tell, 2:12, by William L.; 1889—Sunol, 2:10 $\frac{1}{2}$, by Electioneer; 1892—Arion, 2:10 $\frac{1}{2}$, by Electioneer; 1893—Fantasy, 2:08 $\frac{1}{4}$, by Chimes; 1907—Kentucky Todd, 2:08 $\frac{1}{4}$, by Todd; 1907—General Watts, 2:06 $\frac{1}{4}$, by Axworthy; 1910—Colorado E., 2:04 $\frac{1}{4}$, by The Bondsman; 1914—Peter Volo, 2:03 $\frac{1}{2}$, by Peter the Great. Many breeders have, during the past decade predicted that a three-year-old will eventually trot in two minutes and the prediction seems in a fair way to be borne out sometime within the next decade.

In race track parlance a "green" horse is one that has taken no record. It is possible for a horse to take part in races where the time of the winner is very fast but still, if he takes no record he is still called "green", although the real intent of the term was to specify a horse that had previously never performed in public. There are 135 trotters with records of 2:10 or better that secured those records while technically "green". Curiously enough the fastest trotter in this list is Lou Dillon, 1:58 $\frac{1}{2}$ and she was "green" in every sense of the word as she had never performed in public until the year she flashed on the trotting horizon and placed herself below the two-minute mark before the end of the season. Only two other trotters have beaten 2:05 in their "green" season, the three-year-old colt, Colorado E., 2:04 $\frac{1}{4}$, and the four-year-old mare, Joan, 2:04 $\frac{1}{4}$. Of the other 132 trotters that have taken records of 2:10 or better while "green" five were two-year-olds and twenty-five were three-year-olds. The two-year-olds so distinguished are: Native Belle, 2:07 $\frac{1}{4}$, by Moko; Volga, 2:07 $\frac{1}{4}$, by Peter the Great; Justice Brooke, 2:09 $\frac{1}{4}$, by Barringale; Native Spirit, 2:09 $\frac{1}{4}$, by Native King and Bondella, 2:10, by Walnut Hall.

The three-year-olds similarly distinguished are: Don Chenault, 2:05 $\frac{1}{4}$, by Peter O'Donna; Baldy McGregor, 2:06 $\frac{1}{4}$, by Jay McGregor; Manrico, 2:07 $\frac{1}{4}$, by Moko; Peter Thompson, 2:07 $\frac{1}{4}$, by Peter the Great; Lucile Spier, 2:07 $\frac{1}{4}$, by Directum Spier; Grace, 2:08, by Peter the Great; Rhythmic, 2:08, by Rhythmic; Atlantic Express, 2:08 $\frac{1}{4}$, by Bellini; Binland, 2:08 $\frac{1}{4}$, by Binjolla; Margaret Parrish, 2:08 $\frac{1}{4}$, by Vice Commodore; Virginia Barnette, 2:08 $\frac{1}{4}$, by Moko; Colorado Range, 2:08 $\frac{1}{2}$, by Colorado E.; Fantasy, 2:08 $\frac{1}{4}$, by Chimes; Lou Billings, 2:08 $\frac{1}{4}$, by John A. McKerron; Soprano, 2:08 $\frac{1}{4}$, by Bellini; Straight Sail, 2:08 $\frac{1}{4}$, by Main-sheet; The Harvester, 2:08 $\frac{1}{4}$, by Walnut Hall; Vincent Todd, 2:08 $\frac{1}{4}$, by Jim Todd; Emily Ellen, 2:09 $\frac{1}{4}$, by Todd; Miss Perfection, 2:09 $\frac{1}{4}$, by Gen. Watts; Susie H., 2:09 $\frac{1}{4}$, by Moko; Onward Forbes, 2:09 $\frac{1}{4}$, by J. Malcolm Forbes; Adbell M., 2:09 $\frac{1}{4}$, by Moko; Miss Adbell, 2:09 $\frac{1}{4}$, by Adbell; Miss Pierette, 2:09 $\frac{1}{4}$, by Peter the Great. These baby trotters, each of which beat 2:10 the first season they took a record of any kind, make a plainer illustration of the wonderful advance which has been made in breeding trotting speed than any other form of illustration that can be given.



Boys and Ponies

W. O. B.

*Jack Smith, my fellow fine,
Can you shoe this horse of mine?
Yes, good sir, that I can,
As well as any other man.
Here a nail and there a prod
And now, good sir, your horse is shod.
(Old Nursery Rhyme.)*

My fiery steed has cast a shoe,
So I have brought him, smith, to you.
His fierce attempts to run away
Have caused me anxious moments—say,
Do you know he is hard to hold,
And when at times he gets real bold
I almost have to use the whip,
And give him just an awful clip.

Sometimes he jumps and leaps about,
Seems awful glad just to be out.
He seems so awful fierce and wild,
So I say "Whoa" and then he's mild
Es mild es me when I am good,
Which ain't es often es I should,
But you know how it is with boys
They seem sometimes like wound-up toys.

An' boys like ponies sometimes act
As tho' untrained—it is a fact.
But then you know, you surely do
That once you were a youngster, too.
An' I get wondering if men were
As mild an' gentle always, sir,
As they would want their boys to be
Or if they were more wild an' free.

A colt to be a good, strong horse
Must run, an' frisk you know, of course.
An' so a boy to be a man
That you'll be proud of, surely can—
Not grow up big like you an' strong
If everyone tells him it is wrong
To jump an' shout, an' holler an' run,
To romp an' play an' have his fun.

An' so, good sir, to you I say,
A boy to grow must have his play.
His lungs must shout, his legs must run,
He should be full of life and fun.
For, like a horse kept in the stable
To grow in strength he isn't able,
If he is held with tightened line
He can't grow big and strong and fine.



Heats, Sparks, Welds

A thief of profits also is procrastination.

Think over the turn over—it means added profit to you.

The tightest roof is not always on the mortgage-covered shop.

With the lengthening of the days, does your amount of work also increase?

Cans or Can'ts? Success comes in cans, failure comes in can'ts. Which will you have.

Is there something wrong with your business? Investigate, there must be a cause and there is a remedy.

Any man can cut prices and go into bankruptcy, but it takes a real business smith to make a profit and build a bank account.

Are you keeping shop or is the shop keeping you? There is a big difference. If you keep books, they will tell you quickly.

Sense in business usually means cents in business, but to make the second the result of the first, price cutting is never called in as an aid.

Economy is not the doing without tools which are needed. It is the purchasing of good goods and the saving of that which you get for the money you spend.

What are you doing to advertise your shop? He who believes in advertising, but does not advertise is more foolish than he who advertises, but does not believe in it.

While you are pounding on the anvil, don't forget that an occasional pause in your labors with attention to the garden and its growing things will put new life into you.

Of course, you cannot expect to get all of the business all of the time, but are you going out after business and making certain that you are getting all you can possibly get?

Which do you prefer: To get high prices from a few customers or low prices from many customers? Do good work and get good prices. Good work means better prices and more customers.

Are you getting some of the money that is being spent by automobile owners? If not, it is your own fault. Read the articles in our auto department and learn how to get this money coming your way.

Preparedness is the order of the day. Are you prepared right now to take care of the rush. The time to prepare for the rush periods is during the slack times. Don't let prosperity find you unprepared.

Run over your accounts carefully so that they will not overrun. Constant attention to the debts of your debtors will keep them from getting behind. Remember, if they get behind, then you will be behind.

No smith can forge success for himself with a stone hammer in these days. The modern craftsman with modern equipment in the modern shop is the combination that grabs the premium of success these modern days.

It isn't so much the man who knows as the chap who is willing to try with all his might. He's the fellow who is continually doing the things that were never done before and which he didn't know could not be done.

It may sound nutty but it brought the coin. One of our readers tells about writing the following little note on the bottom end of a statement long overdue: "My

Dear Green—man is made of dust—dust settles—Are you a man?"

The sum of money left after deducting the cost price from the selling price is called profit. A cut at the expense end increases the profit. A cut at the selling end decreases it. What are you doing in these days of increased costs?

If forging the shoe and nailing it on the foot were all there is to horseshoeing, every establishment with an anvil, a forge and a few horse shoes, would house an expert. Knowing that you are doing it correctly is the thing that counts.

The careful smith shop manager looks after his smith shop equipment and machines at regular intervals. He lets no month go by without making certain that every machine from gas engine to blower is in good working order with all nuts and bolts tight and bearings well oiled.

How much salary do you pay yourself? If you are the proprietor, see that you get your pay each pay day. You are worth more to the business than any other man employed in it. Are you getting more? If you cannot pay yourself a salary at present prices, raise your prices so that you can.

Tom Tardy was fretting, sweating, fuming and fussing all because of a job of tire-setting which had come in. In attempting to do the work, he found parts of his tire-setter missing, other parts broken and we could not resist the temptation to ask him if he had ever heard of the word "Preparedness."

Are you in business for your own or your customer's profit? The only one who profits by a cut in prices is the customer. You are a loser because it cuts your profits, your competitor is a loser because it starts unfair competition, your family is a loser because you have less money and your supply house loses because you cannot pay your bills. When a customer is the only one who profits on a transaction, it is time to get out of business. A fair cost price added to a fair profit makes a fair selling price and this combination is the only one that results in a profit for all concerned.

Suppose it were possible to turn your stock once every day—that is to sell all your stock on hand before you close your shop doors at night—what would your percentage of profit be? Consider the grocer who sells bread, for example: Suppose Mr. Grocer buys 100 loaves of bread in the morning. He pays four cents for each loaf or four dollars for his entire stock of bread. He must sell all of it or he will have stale bread on hand and as he sells it at five cents per loaf he makes one dollar of profit or 20 per cent. gross profit per day. The next morning he again buys four dollars worth of bread and at night he will have received his four dollars and another extra dollar called profit. Thus at the week's end he will have six dollars of profit and at the end of the year he will have made 312 dollars gross profit on an investment of four dollars. Or he will have made a gross annual profit of 7,800 per cent. or a net profit of 2,340 per cent. figuring 14 per cent. as his cost of doing business. Of course, it isn't possible to turn over your stock once a day BUT the oftener you turn your stock the more you make.



Our Honor Roll

AND STILL THEY COME

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A. Garver, Ohio.....	Feb., 1926	H. A. Davis, N. Y.....	Dec., 1923
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W. Post, N. Y.....	Jan., 1926	S. Horton, Calif.....	Nov., 1923
Powell Brothers & Whitaker, Eng- land.....	Jan., 1926	J. Spratt, Mass.....	Nov., 1923
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N. Karolewicz, S. Dak.....	Jan., 1926	F. Koppins, Ala.....	Nov., 1923
E. L. Lalin, N. Y.....	Dec., 1925	Y. C. Lienert, S. Australia.....	Oct., 1923
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Williams & Turner, W. Va.....	Dec., 1925	W. R. Turner, Man.....	Oct., 1923
J. J. Devine, N. J.....	Dec., 1925	C. Nelson, Nebr.....	Sept., 1923
P. Nelson, Minn.....	Dec., 1925	H. M. Anderfuren, Calif.....	Aug., 1923
M. Kennedy, Tas. Australia.....	Dec., 1925	Camp Bros., Texas.....	Aug., 1923
A. J. Wassmuth, Idaho.....	Nov., 1925	L. C. Larsen, Iowa.....	July, 1923
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G. H. Isley, Mass.....	Nov., 1925	W. R. Stroupe, N. C.....	July, 1923
Reynolds Bros., Penna.....	Sept., 1925	O. C. Young, Mich.....	June, 1923
F. W. Kraus, Calif.....	Aug., 1925	Otto Sippel, Penna.....	June, 1923
C. E. Allen, Nebr.....	Aug., 1925	A. Chapman, N. Y.....	June, 1923
A. E. Spangberg, Oregon.....	May, 1925	C. Birely, Md.....	June, 1923
D. M. Kille, Okla.....	Apr., 1925	F. H. Stoupe, Penna.....	June, 1923
G. Gullgren, Iowa.....	Apr., 1925	J. C. Stover, Penna.....	Apr., 1923
G. Frericks, Minn.....	Mar., 1925	W. Schoonover, Penna.....	Apr., 1923
V. Prussnitz, Wisc.....	Mar., 1925	J. M. Rumire, Iowa.....	May, 1923
E. Price, Ill.....	Feb., 1925	Lowndale Bros., Mo.....	Mar., 1923
D. C. Garber, Ohio.....	Feb., 1925	J. Carswell, Ark.....	Mar., 1923
J. H. Kurt, Ill.....	Feb., 1925	G. E. Glazier, Ohio.....	Mar., 1923
E. R. Himeshue, Ohio.....	Feb., 1925	G. Fath & Co., S. Africa.....	Mar., 1923
H. F. Schreiber, Penna.....	Feb., 1925	T. Bradley, N. S. Wales.....	Mar., 1923
C. M. Adams, Conn.....	Jan., 1925	L. T. Needham, Ill.....	Feb., 1923
J. S. Damm, Iowa.....	Jan., 1925	G. C. Disinger, Miss.....	Feb., 1923
J. M. Withers, Hawaii.....	Jan., 1925	J. Hughes, Ohio.....	Feb., 1923
F. H. Jarvis, Ind.....	Dec., 1924	J. Wieber, Minn.....	Jan., 1923
Geo. Tatum, Jr., Fla.....	Dec., 1924	Z. A. Enos, Minn.....	Jan., 1923
L. Clark, Va.....	Dec., 1924	W. G. Wise, Calif.....	Jan., 1923
A. N. Estes, Va.....	Dec., 1924	F. S. Bishop, S. Africa.....	Jan., 1923
J. Bailey, Man.....	Dec., 1924	J. Curran, Ariz.....	Jan., 1923
M. G. Naylor, Md.....	Dec., 1924	S. P. Harney, Mont.....	Dec., 1922
Halvorson Brothers, S. D.....	Nov., 1924	W. Breckner, Okla.....	Dec., 1922
P. Schicks, Wash.....	Nov., 1924	J. Pabina, Neb.....	Dec., 1922
H. E. Snyder, Ore.....	Nov., 1924	P. Frederickson, Iowa.....	Nov., 1922
J. A. Stewart, Ky.....	Oct., 1924	L. O. Leirus, Ill.....	Nov., 1922
C. Richenecker, N. Y.....	Oct., 1924	W. Lawson, N. Zealand.....	Nov., 1922
W. L. Bertholf, N. J.....	Oct., 1924	W. O. Grant, Cal.....	Oct., 1922
J. W. Hewson, S. Africa.....	Sept., 1924	W. H. Miller, Iowa.....	Oct., 1922
Ed. Larson, N. D.....	Sept., 1924	A. O. Martin, Idaho.....	Sept., 1922
R. T. Monk, Ill.....	Sept., 1924	O. A. Mortimer, Idaho.....	Sept., 1922
W. T. De Young, Ill.....	Sept., 1924	H. J. Hyatt, Wash.....	Sept., 1922
Charles Wells, Colo.....	Aug., 1924	J. N. Skow, Iowa.....	Sept., 1922
H. G. Weaver, Penna.....	Aug., 1924	A. D. Standiford, Wash.....	Sept., 1922
Working Men's College, Vict.....	June, 1924	T. Temkiewiez, Que.....	Sept., 1922
F. M. Konofer, Nebr.....	June, 1924	A. Pellifer, Ohio.....	Aug., 1922
C. C. Frederick, N. D.....	May, 1924	W. D. Valentine, Iowa.....	Aug., 1922
E. L. Fenton, N. Mexico.....	May, 1924	G. Hoffman, N. Y.....	July, 1922
J. Carl, Iowa.....	May, 1924	J. Erman, Ark.....	July, 1922
J. E. Little, Penna.....	May, 1924	W. K. W. Hansen, Penn.....	June, 1922
H. I. Brenzel, N. Y.....	Apr., 1924	Robert Tochter, Cal.....	June, 1922
W. E. Parr, Iowa.....	Apr., 1924	J. Van Marter, N. Y.....	June, 1922
F. Stramek, Nebr.....	Apr., 1924	F. Norrie, Yukon Ty.....	Jan., 1922
L. A. Hulen, Calif.....	Apr., 1924	E. Anders & Son, S. Australia.....	May, 1922
J. E. Ray, Minn.....	Mar., 1924	Louisa Carriage Wks., Va.....	May, 1922
A. Hulstrand, N. D.....	Mar., 1924	S. Smith, Tex.....	Apr., 1922
W. F. Riske, Wisc.....	Mar., 1924	J. W. Haar, La.....	Mar., 1922
R. F. Seibert, Calif.....	Mar., 1924	D. W. Smith, La.....	Mar., 1922
H. Roeschwetter, Mo.....	Mar., 1924	D. W. Smith, R. I.....	Mar., 1922
W. B. Briant, N. J.....	Mar., 1924	E. A. Dillon, Nev.....	Mar., 1922
A. Beech, N. Y.....	Mar., 1924	D. F. Kuster, Wash.....	Mar., 1922
A. R. Johnson, R. I.....	Feb., 1924	G. F. Johnson, Mich.....	Feb., 1922
F. Jacobs, Ohio.....	Feb., 1924	R. H. Keith, Iowa.....	Jan., 1922
A. J. Ferry, Ill.....	Jan., 1924	F. H. Joslin, Mass.....	Dec., 1921
		J. B. Scheidter, Ind.....	Dec., 1921
		J. H. Ickes, Penn.....	Dec., 1921

NAME	Subscription Paid to
E. Willis, Colo.....	Dec., 1921
O. M. Johnson, Minn.....	Oct., 1921
H. Feldus, N. Be.....	Sept., 1921
A. S. Pratt, New York.....	July, 1921
W. Cornwell, Pa.....	May, 1921
W. F. Kline, Kansas.....	May, 1921
C. A. Butler, Ohio.....	Apr., 1921
E. Mossner, Queens, Australia.....	Apr., 1921
J. Schwarzmann, D. C.....	Mar., 1921
W. T. Wilson, Ind.....	Feb., 1921
J. Schmid, Nebr.....	Feb., 1921
E. Slee, N. Y.....	Feb., 1921
A. R. Skerritt, N. Y.....	Feb., 1921
A. Seidel, Nebr.....	Jan., 1921
W. Ruple, Penna.....	Jan., 1921
N. A. Englund, Iowa.....	Jan., 1921
O. Gerhardtstein, Ohio.....	Jan., 1921
W. C. Rutter, Illinois.....	Jan., 1921
J. L. Jester, Mo.....	Jan., 1921
G. A. Moffatt, Yukon Ty.....	Jan., 1921
O. A. Huff, Penn.....	Dec., 1920
J. T. Rowe, Iowa.....	Dec., 1920
W. Parsons, Ont.....	Dec., 1920
Elisler Bros., S. Dak.....	Dec., 1920
J. Krahulec, Ill.....	Dec., 1920
L. F. Keilholz, Penna.....	Dec., 1920
F. Markgraf, Minn.....	Dec., 1920
S. Wright, N. Y.....	Dec., 1920
T. P. Considine, Mass.....	Dec., 1920
J. D. Fox, Nebr.....	Dec., 1920
W. Trencor, Washington.....	Dec., 1920
A. G. Palmquist, Minn.....	Dec., 1920
J. E. Richards, Penna.....	Dec., 1920
D. Codere, Illinois.....	Nov., 1920
C. Fransen, N. Y.....	Nov., 1920
J. Delane, Nebr.....	Nov., 1920
J. H. Staats, Mo.....	Nov., 1920
George F. Wardle, S. D.....	Nov., 1920
H. C. Strine, Penna.....	Nov., 1920
C. M. McNutt, Mass.....	Nov., 1920
J. M. Mapes, New York.....	Nov., 1920
W. Condon, New York.....	Nov., 1920
F. Strleff, Wisc.....	Nov., 1920
L. P. Mortensen, Mich.....	Nov., 1920
A. W. Brennehan, Ind.....	Nov., 1920
Thomas Scurr, New Zealand.....	Oct., 1920
W. H. Finlay, New Zealand.....	Oct., 1920
J. Jordan, Calif.....	Sept., 1920
L. O. Brekke, Washington.....	Sept., 1920
R. D. Simkins, Penna.....	Sept., 1920
L. R. Garvin, Ohio.....	Sept., 1920
A. E. Reeve, Mass.....	Sept., 1920
G. W. Phillips, Utah.....	Aug., 1920
F. A. Poole, South Africa.....	July, 1920
C. Gibson, Ill.....	July, 1920
H. M. Whitman, Neb.....	July, 1920
The Goldfield Diamond Drilling Co., Victoria, Australia.....	July, 1920
G. M. Robben, Kans.....	July, 1920
E. J. J. Rees, S. Australia.....	July, 1920
F. Felts, Ohio.....	June, 1920
W. M. Puryear, Ala.....	June, 1920
W. L. Patterson, Okla.....	June, 1920
D. Hardy, Viet.....	June, 1920
E. Malpas, S. Australia.....	June, 1920
A. J. Hamburg, Ohio.....	June, 1920
C. M. Holton, Okla.....	June, 1920
C. L. Graf, Ohio.....	June, 1920
A. Mellum, N. D.....	June, 1920
J. A. Schmitt, N. D.....	May, 1920
P. Wright, Calif.....	May, 1920
F. Greer, Queens.....	Apr., 1920
C. L. Morman, N. Y.....	Apr., 1920
Alex. Zimmer, Ont.....	Apr., 1920
J. Weber, N. Y.....	Mar., 1920
Clark Bros, Cal.....	Mar., 1920
W. H. Leonard, Penn.....	Mar., 1920
Ed. Grimm, Tex.....	Mar., 1920
H. L. Place, S. Australia.....	Mar., 1920
J. Hierness, Minn.....	Mar., 1920
G. S. Akers, Va.....	Mar., 1919
W. M. Humphrey, Ky.....	Feb., 1919
J. H. Wildey, Penna.....	Feb., 1919
W. Nasgowitz, Wisc.....	Feb., 1919
J. F. Leiss, N. J.....	Feb., 1919
C. M. Jacobsen, Utah.....	Feb., 1919
I. Blough, Penna.....	Feb., 1919
A. Fisher, W. Va.....	Jan., 1920
I. J. Giguere, N. H.....	Jan., 1920
E. Gunther, Iowa.....	Jan., 1920
L. H. Willson, Vermont.....	Jan., 1920
D. R. White, Kansas.....	Jan., 1920
P. Bianchi, Texas.....	Jan., 1920
R. S. Crisler, Ky.....	Jan., 1920
T. A. Mahar, Me.....	Jan., 1920
T. Horne, Ariz.....	Jan., 1920
H. B. Draper, Ind.....	Jan., 1920
H. H. Schoob, Wyo.....	Jan., 1920
L. A. Costa, Mont.....	Jan., 1920
H. Hine, N. Y.....	Dec., 1919
H. Kraft, Calif.....	Dec., 1919
S. Barber, Iowa.....	Dec., 1919
M. Martin, S. D.....	Dec., 1919
R. I. Ryberg, Iowa.....	Dec., 1919
Dayable & Sons, Vict.....	Dec., 1919
E. M. Crouch, Conn.....	Dec., 1919
R. Werk, Nebr.....	Dec., 1919
J. R. Wilson, Md.....	Dec., 1919
N. Buchanan, Ont.....	Dec., 1919
P. Reif, Ohio.....	Dec., 1919

NAME	Subscription Paid to
A. Larsen, Ida.....	Dec., 1919
H. Andersen, Iowa.....	Dec., 1919
I. F. Powers, N. J.....	Dec., 1919
J. G. Granlund, Conn.....	Dec., 1919
J. B. Horn, N. Mexico.....	Dec., 1919
A. J. Haun, Calif.....	Dec., 1919
A. Clark, Vict.....	Dec., 1919
O. J. Wilson, N. H.....	Dec., 1919
Booth, MacDonald & Co., N. J.....	Dec., 1919
A. Luke, Nebr.....	Dec., 1919
J. W. Rupp, Wisc.....	Dec., 1919
F. G. King, N. Y.....	Dec., 1919
C. A. Smith Penna.....	Nov., 1919
J. B. Beaudet, Quebec.....	Nov., 1919
W. Vallance, N. Y.....	Nov., 1919
W. Schald, Wisc.....	Nov., 1919
J. Delane, Nebr.....	Nov., 1919
P. Gudmundson, S. Dakota.....	Nov., 1919
R. Ramach, N. W. Ter.....	Nov., 1919
J. Nalmsmith, N. Zealand.....	Nov., 1919
W. H. Lick, Ohio.....	Nov., 1919
W. N. Shofield, Mo.....	Oct., 1919
J. Kirsten, South Africa.....	Sept., 1919
P. Wand, N. Y.....	Apr., 1919
J. M. Smith, Pa.....	Apr., 1919
E. Hildreth, N. Y.....	Apr., 1919
J. A. Segars, Maine.....	Mar., 1919
D. Blythe, Ia.....	Mar., 1919
J. L. Reiser, Ind.....	May, 1919
G. W. Cooper, Nebr.....	Mar., 1919
T. Riestler, Indiana.....	Mar., 1919
Short Brothers, Iowa.....	Mar., 1919
W. H. Crumly, Ind.....	Mar., 1919
G. W. Bryant, Vt.....	Mar., 1919
C. E. Spriggs, Kansas.....	Mar., 1919
A. H. Dutton, Vermont.....	Mar., 1919
F. W. Rosenberger, Pa.....	Mar., 1919
E. K. Van Gorden, N. Y.....	Mar., 1919
Ed. Moon, Ind.....	Mar., 1919
Chamberlain Brothers, Nebr.....	Feb., 1919
R. Seltinger, Idaho.....	Feb., 1919
H. Sucher, N. Y.....	Feb., 1919
C. T. Jones, Pa.....	Feb., 1919
J. B. Osborne, Ky.....	Feb., 1919
B. W. Wallace, Ky.....	Feb., 1919
O. Ralke, Ky.....	Feb., 1919
H. Strong, Okla.....	Feb., 1919
J. H. Withereil, Rhode Island.....	Feb., 1919
E. Belcher, Illinois.....	Feb., 1919
H. Diffenderfer, Pa.....	Feb., 1919
L. J. Naber, Illinois.....	Feb., 1919
T. Bush, N. J.....	Feb., 1919
Browitt & Son, Nebr.....	Feb., 1919
F. C. Millburn, Ky.....	Feb., 1919
F. W. Mink, Ohio.....	Feb., 1919
F. Masek, N. D.....	Feb., 1919
J. Hellman, Illinois.....	Feb., 1919
J. Hauser, Ky.....	Feb., 1919
I. D. Benton, Nebr.....	Feb., 1919
J. H. Denny, Kansas.....	Feb., 1919
F. S. Fuller, Colo.....	Feb., 1919
O. Gunderson, Minn.....	Feb., 1919
Conrad & Hortis, Texas.....	Feb., 1919
J. E. Franke, Ind.....	Feb., 1919
A. L. Smith, S. C.....	Feb., 1919
B. H. Bueter, Ky.....	Feb., 1919
Leo Standley, Ind.....	Feb., 1919
Lyel Standley, Ind.....	Feb., 1919
G. S. Spreyer, Nev.....	Feb., 1919
Walter Brothers, Ohio.....	Feb., 1919
P. F. Marcotte, Calif.....	Feb., 1919
J. E. Brasher, Ky.....	Feb., 1919
B. H. Ellis, Iowa.....	Feb., 1919
G. W. Tibbott, Mo.....	Feb., 1919
A. C. Dunston, Michigan.....	Feb., 1919
F. Payton, Okla.....	Feb., 1919
F. J. Martin, Okla.....	Feb., 1919
F. M. Clark, Maine.....	Feb., 1919
R. L. McKenney, Ky.....	Feb., 1919
George W. Carter, Illinois.....	Feb., 1919
C. H. Norcross, N. H.....	Feb., 1919
L. Soucek, Kansas.....	Feb., 1919
W. G. Merrifield, Mo.....	Feb., 1919
J. R. Griffiths, Iowa.....	Feb., 1919
J. Troy, Penna.....	Feb., 1919
T. Bay, Michigan.....	Feb., 1919
E. K. Moore, Maine.....	Feb., 1919
J. N. Tyler, Ohio.....	Feb., 1919
W. A. Tinsley, Kansas.....	Feb., 1919
O. Schuettel, Texas.....	Feb., 1919
J. Holt, Kansas.....	Feb., 1919
E. E. Leed, R. I.....	Feb., 1919
W. Blanke, Wisc.....	Jan., 1919
J. Maybough, Ky.....	Jan., 1919
George Dank, N. Y.....	Jan., 1919
A. Dehlinger, Wisc.....	Jan., 1919
L. Barto, Wisc.....	Jan., 1919
N. W. Wallace, Ohio.....	Jan., 1919
N. T. Howard, Mo.....	Jan., 1919
O. S. Hopper, Mo.....	Jan., 1919
O. F. Stang, Mo.....	Jan., 1919
I. B. Green, Iowa.....	Jan., 1919
A. Ellsperman, Illinois.....	Jan., 1919
A. M. Kanelman, Illinois.....	Jan., 1919
H. L. Wolf, Penna.....	Jan., 1919
J. Bell, Penna.....	Jan., 1919
D. F. Carter, Okla.....	Jan., 1919
J. S. Rush, Ohio.....	Jan., 1919
F. P. Ludwig, Penna.....	Jan., 1919
L. F. Greiman, Illinois.....	Jan., 1919



Screw Threads

Measurements, Standards and Cutting

J. F. SPRINGER.

Screws are of two principal descriptions—metal screws and wood screws. *Metal screws* (that is, screws used in metal) are ordinarily of the same diameter throughout and the thread and the groove are similar in pattern. *Wood screws* taper towards the end and frequently terminate in what may suitably be called a *gimlet point*. The groove of a wood screw is ordinarily larger in size and different in form from the thread. The larger size of the groove is necessary to enable the wood to hold. Let us give our attention just now to metal screws.

Diameter

A lengthwise section through the axis of a screw shows a saw tooth form. If we measure the distance from the tips of the thread on one side to the tips on the other, we shall have the *diameter* of the screw. This measurement may be determined, in the case of an actual screw, by simply using an ordinary or micrometer caliper to get the maximum measurement. However, if screw has suffered from wear, the caliper may not reveal the true size.

Pitch

The *pitch* of a screw is the distance measured parallel to the axis from any point in a thread to the corresponding point in an adjacent thread. Thus, in the case of a sharp thread, the pitch is the distance from one sharp edge to the next, measured parallel to the axis, or from the bottom of one groove to the bottom of the next, measured parallel to the axis. If the thread is accurately cut, we may get the pitch by counting the number of *whole* threads in an inch, the inch being laid out parallel to the axis, just as before. This *number of threads to the inch* is not itself the pitch, but if we divide it into one inch we shall get the pitch. For example: Here is a $\frac{1}{4}$ -inch screw thread—that is, a thread having a diameter of $\frac{1}{4}$ -inch. We measure off one inch parallel to the axis and count the whole threads. There will be, say twenty of them. The metal scale which we hold up against the threads may touch in one inch as many as twenty-one tips. But we are not concerned with *tips*. It is *whole threads* we want. Well, we find that there are exactly twenty of them. The pitch is gotten by dividing one inch by twenty. The

result is $\frac{1}{20}$ inch. This is the pitch in this case. If the screw thread has sixteen whole threads to the inch, then the pitch is $\frac{1}{16}$ inch, and so on.

Lead

The *lead* of a screw is the distance the screw will advance when turned in a nut a complete rotation. If the screw is an ordinary one and has

pitch. Similarly, one should be on his guard not to get pitch and the *number* of threads to the inch mixed.

Length

The *length* of a thread is the length of the blank screw upon which a thread has been put.

Depth

The *depth* of a thread is measured perpendicularly to the axis from the tip of a thread to the line connecting the bottoms of the grooves.

Pitch Diameter

The *pitch diameter* of a screw is the ordinary diameter less the depth of one thread. If, in a lengthwise section, we draw parallel to the axis two lines, one of them half way between the tips and bottoms on one side and the other half way between tips and bottoms on the other side, and then measure the distance between the two lines, we shall have the pitch diameter.

Root Diameter

The *root diameter* is the distance, measured perpendicularly to the axis, from the bottoms of the threads on one side of the screw to the bottoms on the opposite side. The pitch diameter may be found by adding together the outside diameter and the root diameter and dividing the sum by two.

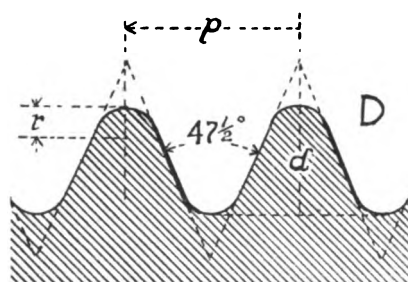
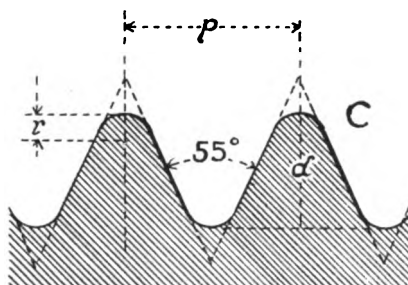
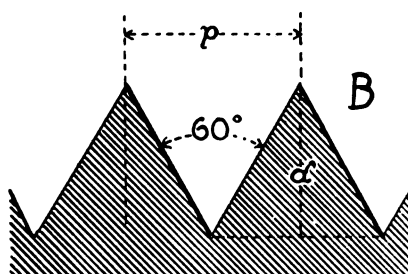
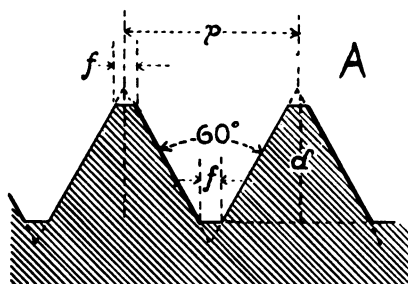
60-Degree V-Thread

There are numerous varieties of metal screw threads. One of the principal types has been the 60-degree, sharp-V thread. This thread is undoubtedly passing out of use, except for special applications. But it has not yet passed. At the same time, it is convenient to begin with it, as it forms a kind of standard of reference. When it is thoroughly understood, the other usual types are not difficult.

A section of this thread through the axis of the screw discloses a triangle, all of whose sides are equal—that is, an equilateral triangle. The angles are all the same, each being an angle of 60-degrees. The pitch is equal to one of the sides. Call the pitch, p . The depth, d , may be found by calculation. It is $0.866 \times p$. The diameter may be represented by D and the pitch diameter by D' . We have, according to our definition of the pitch diameter, $D' = D - d$. Instead of d , we may put its equal, which we have found to be $0.866 \times p$. We put down then the formula,

$$D' = D - (0.866 \times p.)$$

This is not so hard. Let us take an example. Suppose we take a screw $\frac{1}{2}$ -inch in diameter and having 12 (whole) threads to the inch. We get



THE STANDARD THREADS: A.—U. S.—S. A. E.—A. S. M. E.—INT. FRENCH. B.—SHARP V. C.—WHITWORTH. D BRITISH ASSO.

only a single thread, then the lead and the pitch will be the same. However, if the screw has a double thread, or a triple thread, the lead will be twice or thrice the pitch. It is perhaps only a piece of wisdom to be careful and not confuse lead and



the pitch by dividing 12 into 1, thus obtaining, 0.083 inch. The diameter measurement, $\frac{1}{2}$ -inch, we write in the form of a decimal; thus, 0.5. We want to find D' , the pitch diameter. We know D ; it is 0.5 inch. We know p ; it is 0.083 inch. Using our formula, we get,

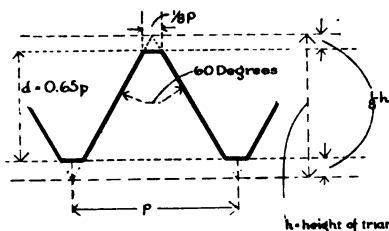
$$D = 0.5 - (0.866 \times 0.083)$$

$$D' = 0.5 - 0.072$$

$$D' = 0.428$$

Disadvantages of V-Thread

One difficulty about the sharp V-thread is that it is next to impossible to make it commercially and have it



THE UNITED STATES STANDARD THREAD

reasonably perfect. The edges or tips of the thread break off or are cut off more or less in manufacture, with the result that the finished screw is apt to be less in actual diameter than it should be. This is the case where the thread is cut by a single cutting edge on a lathe, etc. Where a die is used, after some wear, the threads are apt to get a little too thick. The result is that at the tops of the threads the grooves do not come quite together. This leaves a flat top for the threads. Whether the foregoing sets forth the imperfections with perfect accuracy or not, it has been claimed that "it is a mechanical impossibility to maintain the size of a tap with perfectly sharp threads while a single hole is being tapped—the removal of the metal during the operation causing the sharp tops to be worn away and the original diameter to be lost almost from the outset."

Advantages of V-Thread

The sharp V-thread seems desirable for certain uses. Thus, it seems suitable for steam joints and joints in compressed-air lines, etc.—in other words, where a tight joint is desired. It is said, that "all patch-bolt taps, boiler taps, stay-bolt taps, and arch-pipe taps are as a rule provided with a sharp V-thread."

United States Standard

At any rate, about seven or eight years ago, the tap and die makers concluded to do away with the sharp-V, 60-degree thread and to substitute the United States Standard or Sellers thread in cases where

60-degree threads were desired. This thread is about half a century old. It has secured adoption by the United States Government. It is often referred to as the U. S. S. (United States Standard) thread. The sides of this thread are inclined towards each other at an angle of 60 degrees, but the sides do not meet. There is, in fact, a flattened top to the threads. Likewise, the bottom of the grooves is also flattened. The sides of the thread are, as already said, inclined to each other at 60 degrees. In fact, we can make a sharp-V, 60-degree thread of a screw into a U. S. S. thread by flattening the tops of the thread in a die the proper amount. We next cut the thread on the screw blank. We now have threads with sharp tops and grooves with flat bottoms. Accordingly, we now flatten the tops the proper amount, and we have as a result a U. S. S. thread. This example will serve perhaps to make clear just what style of thread this is. It is not recommended that screws be made in such way. The number of threads per inch would probably be wrong in the finished screw.

The pitch of a U. S. S. thread may be found as before by measuring parallel to the axis from any point in one thread to the corresponding point in the next thread. We may, for example, measure from the middle of one flat top to the middle of an adjacent flat top. Or, just as before, we may count the number of whole threads in an inch parallel to the axis and divide this number into one inch. Thus, a $\frac{1}{2}$ -inch U. S. S. screw has thirteen whole threads per inch. We divide thirteen into one inch and get 0.077 inch. This is the pitch for this particular case.

I have spoken of the flat top of the thread and the flat bottom of the groove, but have not said how much flattening is to be understood. In order to understand this matter, finish out the triangles of a section of U. S. S. thread. We flatten the tops until $\frac{1}{8}$ of the whole depth of the triangles is cut away. Similarly, at the bottoms of the grooves, we take away $\frac{1}{8}$ of the entire depth of the triangles. Altogether, we take away $\frac{1}{4}$ of the whole depth— $\frac{1}{8}$ at the top and $\frac{1}{8}$ at the bottom.

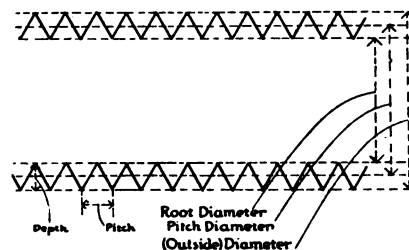
Depth and Flat of U. S. S.

If we want to calculate the depth of a U. S. S. thread, we may do so by simply multiplying the pitch (p) by the decimal, 0.65. The width of the flat (top or bottom) is gotten by dividing the pitch by eight—or, what is the same thing, multiplying

the pitch by the decimal 0.125.

Machine Screws

Machine screws are commonly made in such form as to provide a variety of the V-thread. That is to say, the bottom is left sharp and the top is flattened. It seems impossible to say how much the flattening is, as manufacturers do not all follow the same practice. However, a special form of thread, similar to the U. S. S. has been adopted by the American Society of Mechanical Engineers. This is a new standard, the adoption



THE PARTS OF A SCREW ARE NAMED

by the Society dating only from 1907. In this thread the basic standard form requires that the flattening at top and bottom of threads shall be $\frac{1}{8}$ of the pitch. This is precisely the same as with the U. S. S. Further, the thread has, like the U. S. S., a 60-degree angle. The principal difference in the Mechanical Engineers' Standard relates to the number of threads per inch allotted to the various sizes. The new standard relates only to screws whose diameters are less than $\frac{1}{2}$ inch. There are twenty-one sizes, varying from a diameter of 0.060 up to 0.450 inch. For sizes from 0.060 up to 0.190 inch, one size differs from the next by 0.013 inch. For example, the next size larger than 0.060 inch is 0.073. After reaching the size 0.190, the sizes increase at a double rate. Thus, the next size is obtained by adding 0.026, when we get 0.216 for the diameter. The new standard provides moderately fine threads. Thus, the smallest size, the one having 0.060 for its diameter, has 80 threads to the inch. The very largest size, 0.450, has 14 threads. This merges very well into the U. S. S. and V-thread sizes and number of threads.

International and French

The International System (S. I.) and the French System (S. F.) are substantially in agreement with the U. S. S. The rounding at the bottoms of grooves more or less used abroad is not employed ordinarily in the United States. The number of threads per inch is generally greater than for equivalent diameters in the U. S. S. In fact, the threads are



rather finer than for the same diameters of the Mechanical Engineers' Standard. In both these European systems, the diameter and the pitch are both given in millimeters. The diameters are thus in general odd sizes to us. The number of threads per inch naturally comes out with fractions. For example, there is a size common to both the S. I. and the S. F. where the diameter is 10 millimeters. This means a diameter of 0.394. This differs from sizes in our systems. Even the Mechanical Engineer's Standard does not have this size, although it has one near it. The corresponding pitch is 1.5 millimeters. This means a pitch of 0.059 inch. The number of threads per inch is 16.95—almost 17, but still not 17. Even with the metric system of measurement, the pitches are not always such as to give an integral number of threads per millimeter, centimeter, decimeter or meter. That is, they have fractional numbers of threads per unit of length. With our systems, this is altogether avoided. The number of threads per inch is a whole number, whether it is the V-thread, the U. S. S. or the Mechanical Engineers' Standard. On the other hand, these foreign systems do not have fractions in the diameters. They are, generally at least, a whole number of millimeters. We have fractional diameters in plenty. We think of the number of threads per inch when thinking of the fineness or coarseness of the threading; they think of the size of the pitch and apparently pay but little attention to the number of threads corresponding to a millimeter or a centimeter. It is a difference in point of view.

(To be Continued.)

Old Style Rifling Machines

L. R. SWARTZ

The old hunting rifles were all furrowed by hand and at first they had but slight twist as compared with later types of muzzle loaders and breech loaders. When I was a boy, most of the old hunting rifles were made with a twelve foot twist, i. e., they would cause the ball to make one turn in twelve feet as it left the gun.

I have an old muzzle-loader that was cut to a four foot twist, but it was rather an exceptionally well made gun for its time. It appears that many gun makers know nothing of the process of cutting a gaining twist, and I believe that the Henry muzzle loaders during the late 50's and early 60's were about the first to

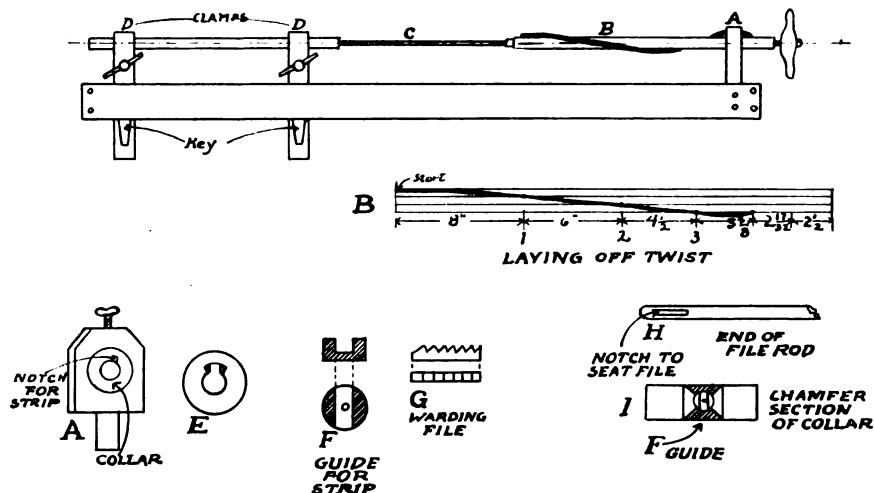
be made in that way. However, that may be, the gaining twist was a great improvement because the bullet left the powder on furrows but slightly twisted and gained twist until it reached the muzzle. This permitted the breech to be cut at about a four foot twist to let the lead or patch in the furrows and then to increase the twist gradually to 20 inches or 24 inches at the muzzle.

On the merits of the various systems of rifling barrels, there are as many arguments put forth as on tire setting problems. Some makers use three furrows, some four, five or six. Some cut narrow furrows, others wide. Some deep and some shallow furrows. Some work the base in a five or six sided polygon the whole length of the barrel.

My own opinion if I may venture

knew a darkey who was thought to be a pretty good marksman. He concluded that his rifle was not shooting as well as it should; so he went to the gunsmith and ordered him to cut a new set of furrows of the same twist, but in an opposite direction to those in the barrel. That darkey always afterward bragged about the great improvement made in the shooting of the gun. I never looked at the gun but I rather think that the gunsmith just freshed out the furrows in the barrel and left them as they were because such a barrel cut both ways would be sure to cut, patch and strip the ball. I have only mentioned this to show what peculiar and diverting ideas some may have about rifling.

The bed of a rifling machine is framed the same as the bed of a



THE TOOLS AND METHODS USED BY THE OLD-TIME GUN-SMITH

to express it, is that the width of the land and the furrow should be about the same, the furrow should not be cut so deep as to allow the gas from the powder to span the ball through the furrows, and that very little choke be given the base.

Before the days of the breechloader, some makers bored three inches or four inches of the muzzle smaller than the rest of the barrel. Such guns were said to shoot a forced ball and by many were much esteemed. They were hard to load and from my own experience, found little to recommend them when compared with other good rifles.

There was also another style of rifling called *Straight Cut* in which the furrows were cut straight in parallel lines from muzzle to breech of barrel, these guns were used both for powder and shot as well as for powder and ball just as smooth bores and were no better than good smooth bores at anything over 50 or 60 yards. During the early 80's I

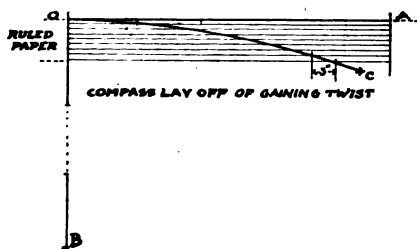
wood lathe and the way for the clamps is three times as long as the longest barrel to be furrowed. At one end is secured the Head-block A through which the guide rod B works. This guide-rod is the business end of the machine because it guides the warding files to cut the furrows. To the end of the guide-rod is fixed the file rod C. The other end of the guide-rod is fitted with a swiveled handle. These guide-rods are made of seasoned straight grained wood, round and about two inches in diameter. A strip of straight grained hard wood is worked out about 1/2 inch and fastened to the guide-rod in a spiral to the twist of the furrows to be cut.

To lay out this twist is a matter of a little calculation and some nicety. The rod is worked to an octagon and a rather deep gauge mark drawn in the center of each face from end to end. The corners are then taken off to a round either by hand or in a lathe. Then the rod



is spaced off to the proportion of the gain. Say there is to be $\frac{1}{4}$ gain in the twist, and the twist starts at 5 $\frac{1}{3}$ feet.

The first mark, beginning at the end to which file rod is attached, is eight inches from the start; second mark six inches from the first; third mark $4\frac{1}{2}$ inches from second; fourth mark $3\frac{3}{8}$ inches from third; fifth mark 2 $\frac{17}{32}$ inches from fourth and it is well to carry over to a sixth mark $2\frac{1}{2}$ from fifth. This will give a muzzle twist of 20 inches on a 24 inch or 26 inch barrel. Of course, any twist may be laid out but this was chosen merely for example to show the principle involved. These marks should be carried clear around the rod at each space. In this way it is as easy to lay off a right hand as a left hand twist, and if the rod is rounded in a lathe these marks are easily put on with a pencil. The next step is to fasten on the square strip and if this is not pretty tough, it had better be steamed. Place one edge of the strip just to the first mark, leaving an inch or so extend past the start, tack strip at first mark, then tack so as to have edge come to gauge line at start, bend strip over and tack strip with edge to gauge line at second mark and keep on bending strip and tacking. The edge of strip must rest on the cross formed by the space mark and the gauge mark at each step when tacked in order to keep the gain and twist regular. After the whole strip has been tacked at the marks, it may be securely tacked between the marks. The object in tacking only



ANOTHER PLAN FOR LAYING OFF GAINING TWIST

at the marks when bending the strip is to permit the strip to spring a little between the marks and so compensate for the slight offset caused by the gain at each mark.

If you have at hand a barrel that has the proper twist the rod can be very easily marked for the strip with a pencil attached to the head block. Clean and oil the barrel and clamp it into position. Have the handle and file rod attached with a cast of lead on the end of the file rod

that will lightly fit the bore, place an oiled patch on the lead and force it through the barrel. The point of the pencil will mark the twist on the guide rod and the strip may then be fastened with the edge to the line leaving a little of the strip over at each end.

To lay out an even twist one need only space the guide rod at even distances to suit the twist, thus, four feet twist the spaces should be six inches each.

In this, as in many things, various expedients were resorted to obtain results. Some men did their rifling by using a long, heavy gun barrel of large bore as a guide. The file rod was long enough to reach through both barrels. Catches were worked on the rod and a cast of pewter was made around the rod for a guide in the large barrel which was deeply cut with wide furrows.

The head-block B is made in two sections; the block proper and the collar which carries the guide through which the strip works. This collar must be chamfered on each side as shown at I and a guide shown at F pocketed in the notch. This guide should fit and be secured in a round pocket—secured by a screw—so that it may turn a little to prevent the strip from binding when the twist is increased.

The strip must fit close in this guide so as to cut a true furrow. The face of the collar may be marked off in even spaces to correspond to the number of furrows to be cut in a barrel and a pointer attached to the block by which the furrows may be evenly spaced when cut. The thumb-screw at top of block is used to clamp the collar in position; because it must be rigid. The file rod should be of steel and polished. The notch to hold file should be set at a slant to conform to the twist. This notch H should be sunk into the rod like a mortise and the file fit in it close. The old practice was to have the rod a little small, put the file into place and insert into the barrel, then melted lead or pewter was cast about the rod in the barrel. This pour was about $1\frac{3}{4}$ inches or 2 inches long on the rod. The file was then run through the barrel for each furrow to be cut. After all the furrows were struck, a piece of paper was placed under the file in the notch and the process repeated until the furrows were deep enough.

The file is shown at G. For a sharp twist the file should be short. These files are to be had from Great Western Gun Works, Pittsburgh, Pa., or

they may be made in the shop.

Another plan for laying off gain twist is to rule a strip of paper a little longer than the barrel to be cut, and just wide enough to go round the guide rod, lay out the right angle O A B. Place the start-



FIG. 1.—JOINING TWO 20-FOOT PIPE SECTIONS EACH 10-INCHES IN DIAMETER AND $\frac{3}{4}$ -INCH THICK

ing point of paper at O, with one edge along the line O. A., along the edge of the paper. Then from A to B measure the length of the barrel and make a mark. Then measure back toward start three inches from the mark made and draw across on the second line. Then with a line or wire as a bar compass draw the arc O C so that it will cut the mark next to C, the cross on second line and the point O. The turning point from which you draw O C will lie somewhere along line O B. The paper should be ruled to eight even spaces or the second line from B, should be $\frac{1}{8}$ of the width of paper from the edge. The paper may then be pasted around guide rod with one edge to a gauge line running from end to end of rod. The curved line will form the guide for fastening the strip to rod. This requires more room than the first plan, but is more accurate. This machine may be built on feet or fastened to workbench.

A Big Oxy-acetylene Welding Job

C. R. SUTTON

One of the most remarkable gas main construction jobs on record was recently completed at Waco, Texas. Two mains of extra heavy pipe of $\frac{3}{8}$ in. wall and 10 in. diameter were laid across the Brazos River under unusual difficulties.

Owing to the fact that the Brazos River at this point frequently rises very suddenly, extreme caution had to be exercised in proceeding with



the work in order to guard against the pipe and temporary false work being washed away.

Another problem which presented itself for solution by the engineers in charge was the fact that the entire river bottom was covered with deep layers of quicksand.

In spite of these natural barriers, the job was undertaken and completed without a hitch in the original plans. According to reports received lately from Waco, the pipe lines are working satisfactorily in every respect and the engineers who superintended the work are highly elated over the success of the undertaking.

It was not thought advisable to run the chance of having the pipe washed away from the top of the false work by a sudden rise of the river and the twenty-foot lengths of pipe were therefore first welded together by the Prest-O-Lite oxy-acetylene process into 100-foot sections in the pipe ditch on the west side of the river, well above the water line.

A close view of the oxy-acetylene welding is shown in Fig. 1, the gas supply (oxygen and acetylene) being furnished from portable cylinders which were moved from point to point as the work progressed. Owing to the fact that beveled end pipe had not been ordered, it was necessary to set the pipe lengths about three-eighths of an inch apart so as to



FIG. 2.—HOW THE PIPE WAS WELDED INTO 100-FOOT SECTIONS ON THE BANK OF THE RIVER

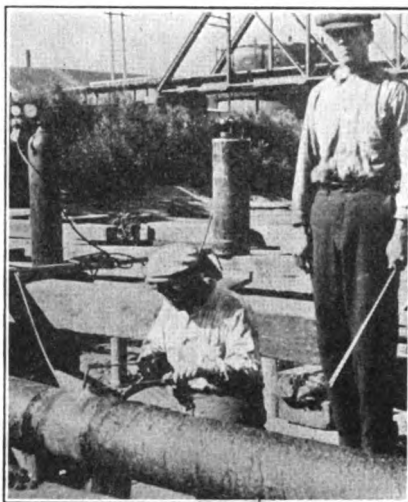


FIG. 3.—WELDING THE 100-FOOT SECTIONS IN MID-STREAM

make a butt weld, using Norway iron welding wire as a filler. It required about forty-five minutes to make each joint on the unbeveled 10-inch pipe. In making a welded joint on 10-inch steel pipe with the ends beveled at a 45 degree angle, as now furnished by the leading pipe manufacturers, it is found that only thirty minutes are required, using about 35 cubic feet of compressed oxygen and 21 cubic feet of compressed acetylene. About 14 ounces of filling material are also required, making a total cost of \$1.10 for making a joint in this size pipe with oxy-acetylene.

These welds were first tested for strength by placing a block under the joint. The weight of two men was supported, one at either end, without effecting the joint, in spite of the leverage of the combined weight of the pipe itself and the men at the ends. A pressure test was later given each welded section by subjecting them to 90 pounds gas pressure without the sign of a leak.

A partial view of the ditch in which the pipe was welded into 100-foot sections is shown in Fig. 2. After the 100-foot lengths of the submarine section of the gas mains had been welded together in the pipe ditch at the side of the river, at about the same level with the top of the false work, they were pulled out over the false work for the final welds which were made in the shortest possible time. Fig. 3 shows a view of this work, with the portable steel cylinder of oxygen and acetylene shown conveniently perched out on the cross members of the false work.

The welder was followed by a workman who painted the pipe with an asphalt coating. Burlap was then wrapped around the pipe and coat-

ed with asphalt. A second wrapping of burlap was then given, with a final coat of asphalt.

Fig. 4 shows the 10-inch main being welded to the drip pocket, and also the outlet pipe welded into the top of the drip pocket. When the cast iron drip pockets were received from a point in the central states it was found that they could not be used because these castings were full of tiny sand or blow-holes. There would have been a very serious delay had it been necessary to await new cast drip pockets but the oxy-acetylene process was called on to meet the emergency, and the two drip pockets were quickly and economically made from boiler plate on hand, using the oxy-acetylene cutting blow-pipe for cutting the boiler plate to proper size. By welding all seams with the welding blow-pipe, stronger and neater seams than could be obtained by the former laborious method of punching and riveting were made possible. The new drip pockets were 24 inches in diameter and five and a half feet high when completed. Fig. 5 shows the entire length of pipe, 550 feet, required to span the river with the drip pockets welded on, tested, coated and suspended, all ready to be lowered into the water.

The Cause of Pin Holes in Oxy-acetylene Welds

M. KEITH DUNHAM

A reader asks: "Can you tell me through the paper the cause of pin holes in castings after welding same

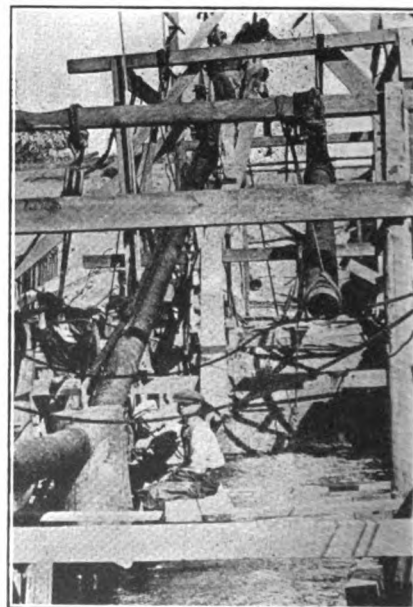


FIG. 4.—THE DRIP POCKET WELDED INTO THE PIPE LINE



with the oxy-acetylene torch. We use oxygen supplied in bottles by the Linde Air Products Company."

Reply: Three things may cause pin holes in the line of welding on cast iron, viz., a poor welding rod, an improper flux or carelessness.

A welding rod too low in silicon or one cast in a sand mould may produce blowholes; therefore, the first thing to look out for is the proper selection of the welding rod.

Second the importance of the flux should be recognized for if this is not suitable, blowholes are bound to result. All good welders should know that for any metal the materials must be correct to obtain the right results and I am assuming that you have the proper welding rods and fluxes. If you haven't, by all means secure them.

Workmanship is, of course, the most important of all, as it is in all kinds of welding. Holding the flame too long on one section after the material has become a fluid causes gases to form in the metal and in cooling, the weld will not always give up these gases and blowholes or pin holes result. Flowing metal from the welding rod on to a cold surface will also produce blowholes. Sand or dirt which assumes an incandescent appearance under the flame must be removed from the line of welding by playing the torch around it and then scratching it out with the welding rod.

To summarize then you must have good welding materials which may be obtained from any responsible supply house. You must be careful in welding to keep the casting and the welding rod in fusion at all times. You must not keep the welding flame on the line of welding after it has been welded and you must eliminate dirt or sand from the weld.



FIG. 5.—READY TO BE SUNK TO THE BOTTOM



Benton's Recipe Book

The preservation of ornaments is sometimes a problem in the repainting of an elaborately trimmed car or even when the car contains a simple monogram, it is not always desirable to repaint the monogram after the car has been refinished. A simple means of preserving these ornaments or monograms is therefore a money-saving and a time and labor-saving stunt. One method is described as follows: First coat over the ornament or monogram very carefully with a mixture of thin glue and gilder's whitening. This is very quick drying and need not delay your subsequent operations. The paint coats, and also those of color-varnish are then spread over the entire surface to be covered just as though there were no ornaments or monograms to be preserved. After the color-varnishes are in place and dry, rub the surface with pulverized pumice stone and water which will soon disclose the ornaments or monograms. The depression which naturally results in this method and may now be brought up to the depth of the surrounding surface by applying a coat or two of quick rubbing varnish after which the entire surface of the car may be treated with the remainder of the clear finishing coats.

The accumulation of dirt and dust on the surface of hardening solutions that are not in constant use is a serious problem for the careful smith. It is not usual that covers are always handy for placing on the hardening baths. The following simple stunt will therefore be of interest to those smiths who make occasional use of special hardening solutions and which are usually kept in readiness. Cut a sheet of newspaper, a single thickness will do, to just cover the top of the hardening bath and place it upon the surface of the solution. When ready to use the solution, removing the paper will carry with it any accumulations of dust and dirt that would otherwise have found their way into the solution instead of being easily removed by this means.

The tempering of a chisel, is F. M. G.'s problem. The receipt book "speaks" as follows: Heat the chisel to a dark cherry red for about 1½ inches up from the cutting edge, then cool the edge in water and rub it on an emery or whitestone. Now, let the heat run down to a dark straw color and then cool the edge again and brighten as before. Now, let the heat draw to the color of pigeon blue and then cool the entire chisel. The book also says that chisels tempered in this way will stand very much better than if tempered by the regular method.

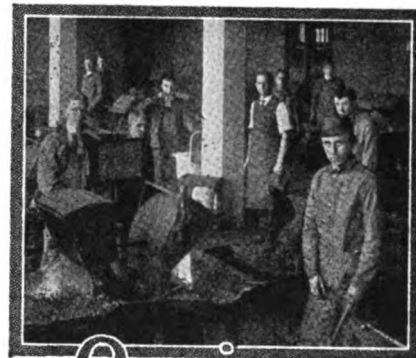
A good stunt to know about in these days of rejuvenated machines and automobiles in that the application of clear alcohol will remove stains of practically

every description from polished metal parts. You will find this method particularly successful against the stains produced by dried accumulations of oil and grease.

A soldering paste, for use in soldering copper wires, is made by mixing one dram of a saturated solution of chloride of zinc with 1½ ounces of vaseline. This can be used where an acid would be objectionable.

When a dull file is apparently the cause of considerable annoyance and "blue air" in the vicinity of the filing bench, try the following treatment: Dip the offending file in gasoline and then with a good stiff wire brush scrub the file thoroughly. If the accumulation of dirt still persists in sticking to the file teeth, a repetition of the treatment may be necessary, but in any event, you will find the file working more efficiently after this treatment, if the teeth are not entirely worn off. After treating a file in this way and to prevent further accumulations of dirt, etc., rub the file liberally with chalk or soapstone.

There are many methods suggested for preventing lead from sticking to the work heated in a lead bath for hardening, but the following appears to us as being easy of application and, if carefully done, thoroughly efficient. Make a mixture of lamp black and alcohol or water, of about the consistency of ordinary paint. This mixture is applied to the work to be immersed in the lead bath and after being allowed to dry thoroughly, the work is dipped in the regular way.



Queries—Answers—Notes

A Forming Tool Wanted.—Will you or some brother craftsman suggest some tool, preferably hand made, to bend angles as shown on page 204 out of 3" by ½" stock like this. P. J. MALONEY, New York.

A Question of Partnership.—The first of December, 1915, I bought a half interest in a blacksmith business. My partner owns the shop or real estate and I pay him rent. I signed lease good until May, 1917. I also signed an agreement for partnership to run that long. What I want to know is can I make him buy or sell, if I am willing to take the same price as I am willing to give, or can he hold me.

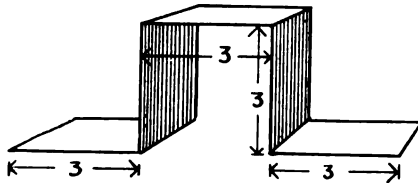
PARTNERSHIP.

In Reply.—If you formed a regular partnership, you cannot compel your partner to sell his interest to you nor can you compel him to buy your interest. At the end of the time, however, you can obtain a legal separation from him and a division of the assets but this cannot be done until the expiration of the partnership in May, 1917.

E. J. BUCKLEY.



The Strength of Bands.—Will you kindly enlighten me in regards to some rings. The rings are to be $7\frac{1}{4}$ inches inside diameter of one inch square stock and when finished to be shrunk on the hub of a flywheel. I claim that a welded ring will answer as well as a weldless ring. Also how about



A FORMING TOOL WANTED

rings for a crankshaft, six inches in diameter of two by $\frac{3}{4}$ inch stock when finished.

If a crankshaft or flywheel is going to crack will the small additional strength of a weldless ring of such small stock keep it from cracking? FRANK KUMMER, Ohio.

An Indiana Shop.—I find the journal not only good to read, but it has some good advertisements in it too. I just got a new machine and I have tried it out and I find it to be just what the advertiser says it is. It is the best device I ever saw and I have tried lots of them, as I am a shoer of twenty years' experience and I have been a globe trotter since I served my apprenticeship. I have been running a shop for myself for eleven years and I say for every young man—don't be a trotter, as it is an awful slow way of making money.

I will have to say that "Our Journal" is the best trade paper there is. I have been a reader of it for several years and I have all of them yet, as they are the best to refer back to. I have gained lots of valuable reference from them. Anybody can get in a debate with some of the writers on shoeing and that is the best study on earth for a young man.

J. D. CARRICO, Indiana.

A Score of Questions on Forging.—Will you kindly publish information on the following forgings, detailing in each instance the steps necessary to complete the forgings mentioned. How are swages made in sizes from 3-8 inch up to 1 1-2 CMF CM sizes from $\frac{3}{8}$ -inch up to $1\frac{1}{2}$ inches and

is the cupping tool for bolts forged? How are fullers and flatters made? Kindly describe the processes in forging these articles without the aid of a steam hammer.

How is the piece illustrated at A in the engraving made? What is the formula for figuring angle iron rings, both with the flange inside and with the flange outside? How are rings of this kind scarfed and welded, also how are T-iron rings scarfed and welded? In the engraving at B is shown an angle iron frame—how is this made with a scarf and a weld in the last corner?

At C in the engraving is shown a wrench with a $2\frac{1}{2}$ -inch opening, the entire length of the wrench being 18 inches. How is this wrench forged out of the solid and also out of iron, welded, both methods without the aid of a steam hammer? How is a socket wrench for a two-inch hexagonal nut forged by welding on a collar? How would you bend and weld a band to fit over a temper, 3 by 4 inches in size, using 4-inch by 3-16-inch stock? How would you forge eye bolts from $\frac{3}{8}$ -inch rod iron so that the eyes will look like solid eyes?

At E in the engraving is shown a pair of tongs to hold round stock and bolts. How would you forge these tongs? How would you forge a pair of tongs for handling lead crucibles?

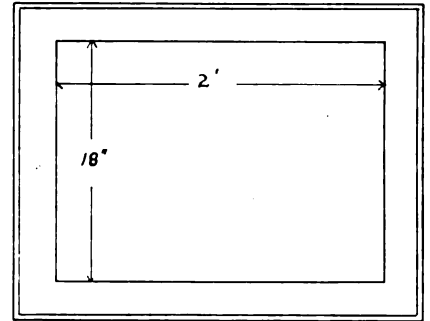
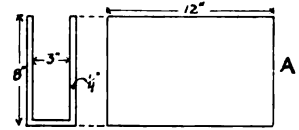
What is the formula for calculating and bending iron edgewise to make a ring that will flare larger on the bottom than it does at the top? At F, in the engraving, is shown a forging—how would you build this from $3\frac{1}{2}$ by $\frac{3}{8}$ -inch stock? At G is shown a square chain-link for a sidewalk canopy? How would you make this out of $\frac{3}{8}$ -inch square stock? At H is shown a printer's chase. How would you go about the forging of this? How is a water tuiere made? How would you forge the figure illustrated at I in the engraving? How would you make the piece illustrated at J, out of one by 3-16-inch iron? How is a hollow fire built?

Kindly enlighten me on the foregoing, detailing each successive step in the forging and making of these articles.

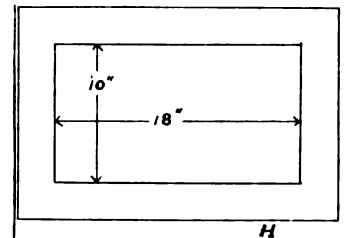
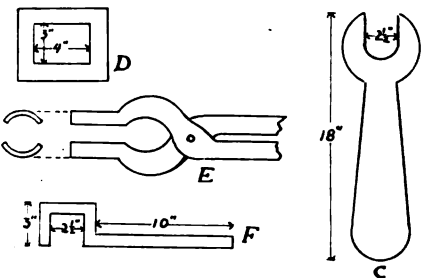
CINCINNATI.

The Auto Problem in Oregon.—To what extent has the auto hurt the smith? Well

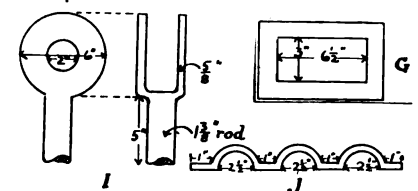
ing horses in town and about forty livery horses, also about twenty delivery ani-



B



H



A SCORE OF QUESTIONS ON FORGING

mals. There are now two driving, eight livery and six delivery horses. The transfer companies are about the same. There are few autos among the farmers. It also hurts in another way, i. e., most horsemen have lost all pride in their horses and rigs. Rigs are allowed to rattle and go to pieces without paint or trimming and harnesses are also allowed to go to pieces. Horses are not cleaned or fixed up. The animals can't beat the auto, so it doesn't matter whether they go a mile in one hour or two. Of course, there will always be some horseshoeing, wagon work, etc., but if the smith holds his own, he will have to change his ways. From now on it will not be a hammer and tongs job. We have to have good buildings, tools, more room, light and help enough to shoe a team, repair a wagon and work continuously on any auto we can get until it is finished. Men with horses to shoe will not wait. (They never did). Men with autos to fix will not wait. (They won't stand for it.)

Now as to the needs of the smith as I see it, he must have a primer on auto



MR. J. D. CARRICO'S INDIANA GENERAL SHOP

$1\frac{1}{2}$ inches up to three inches? How is a collar swage forged? How are the tools for making hexagonal nuts made? How

—here in our town of 2,500 people, I should say it has cut our business in half. Five years ago we had about eighty driv-



work. That is, he must know terms and names of parts as to what they are, and what they are for. For example, I run a large auto of my own for over a year before I knew what an intake manifold was. Then, when it comes to the electric terms, coils, generators, magnetoe, armatures—they are stickers for the old smiths. What we want is some one to explain these things in detail. To tell us the whys and wherefores. I take magnetoes apart and repair them, but don't understand why they do the work, and don't know the names of the different parts. The average smith is a better mechanic than the average man, that is repairing autos, but don't understand how to start, and start he must or take a back seat.

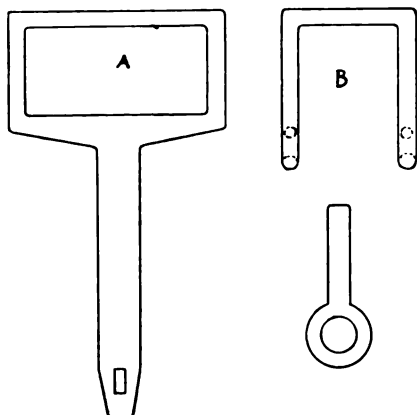
I still would like to know how to temper auto springs, although I have been doing it with good success. But my process is too slow. Also would like to know how to make a cheap furnace for tempering and heating springs. Will have to burn coal.

D. A. HART, Oregon.

Digging up Your Opportunity.—I started two years ago carrying a small line of machine extras. Last year I bought \$200 worth of extras and this year I do not know how high it will go. I have learned lots of things through "Our Journal" and that piece about a year ago this winter about starting something set me thinking. Times were rather dull with not much doing. I happened to know of a man who wanted a cream separator, in fact, he was going into town to buy one, and was in a hurry for it. I said: "Let me sell you one," and he said: "if I could get it the next day for him, he would take it." Now, I never sold a separator before and did not have the agency at the time. He told me what the other people wanted for theirs and if I would meet their price, he would buy of me. Well, I spent 40 cents for telephoning and \$3.00 for express, got the machine the next day and made \$62.50 on the deal. Now, I credit this to "Our Journal." Just start something. Get out and see what your customers need.

ED. F. STALEY, California.

Two Locomotive Forgings.—Will someone kindly tell me how to calculate the stock for the forgings shown in the accompanying engraving? At A is shown a yoke which I would like to know how



TWO LOCOMOTIVE FORGINGS

to figure while at B is shown a hanger for which I would also like to have the formula for calculating the stock.

EUGENE BELTZ, Pennsylvania.

A Tire Helper.—Almost everybody has seen a cellar door or something similar which has to be raised or lowered, and which is made easier to operate by having

a counterweight attached by means of a rope and running through a sheave with a weight on the other end. Now, if your shop is arranged so you can do so the next time you have some real heavy tires to weld, use this same principal in lifting and holding these tires while you are welding them. Make a large, round hook, say 8 inches or 10 inches in diameter. Leave it open enough to slip it over the tire. To this hook, attach a long rope, pass it through a sheave directly above the spot which is midway between the anvil and the forge and as high as you can get it under the roof. From this sheave pulley, pass the rope on through another sheave which is above some out-of-the-way corner of the shop. On this end of the rope, tie a bucket or keg into which put enough scrap iron to almost lift the tire up off the anvil or forge. You can now handle the tire without the aid of a helper for this purpose, and when you lay the tire down on its side to hammer the edges (with the proper weight on the other end of the rope) the counter weight will hold the tire up without any effort on the part of the blacksmith and without the aid of a helper.

ED. DIETRICH, Indiana.



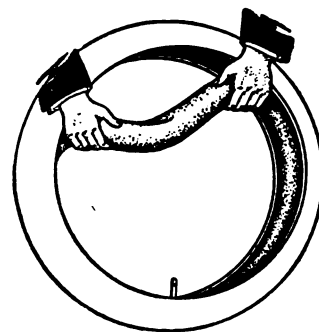
The Automobile Repairman

Putting the Car in Service

VICTOR W. PAGE, M. E.

In many sections where the weather conditions are not of the best during the winter season, it is customary for the motorist to store the car in the late Fall and not use it until the Spring. This means that for a period of three or four months that the car is inactive and before it can be used again there are certain precautions which must be taken to fit it for another year's service. Many motorists have their cars overhauled at this time when they can best spare the car and as a consequence they are ready for another year's work when the repairs are completed. The smith may be called upon to assist in putting a car back in commission so it may be of interest to outline some of the necessary steps in preparing the car for a further period of usefulness. It is

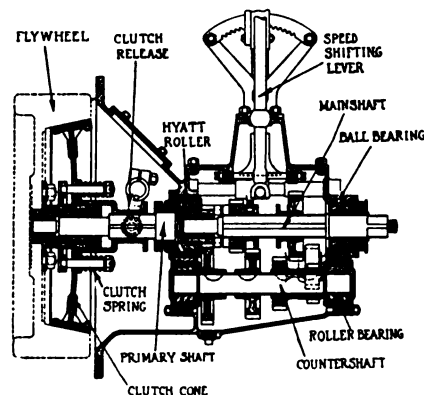
assumed that when the car was stored it was jacked up to relieve the tries of the weight and that the water was drawn out of the cooling system. As a rule, nothing else is



EXAMINE THE INNER TUBE CAREFULLY FOR CRACKS OR WEAK PLACES

done except to cover the car to keep it clear of dust.

The first step is to remove the tires, to carefully inspect all of the casings for weak spots and the inner tubes for cracks where they have been subjected to an abrupt bend as for example, near the wheel rim. If any weak spots are found in either the casings or the inner tubes these should be reinforced in a suitable manner, as there is nothing more annoying than a lot of tire trouble early in the season. While the casings are off the wheels, the interior should be thoroughly cleaned out and the hand rubbed around the inside to feel if there are any broken layers of fabric or any sharp objects, such as the end of a nail or tack which would cause damage at some future time. The old, hardened talc should be removed, the inside of the casing thoroughly washed out with gasoline, taking care to remove all

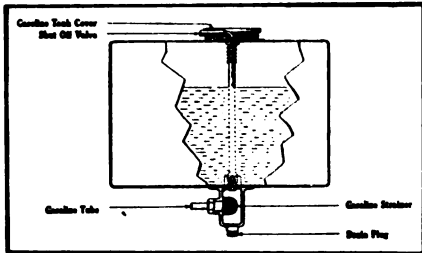


TYPICAL CONE CLUTCH AND CHANGE SPEED GEAR ASSEMBLY FOR UNIT POWER PLANT

lumps or ridges of the hardened powder. After the casing interior has dried, sprinkle some new and



fresh soapstone in the casing interior before the inner tubes are replaced. Another thing that should be done while the tires are off the wheels is to thoroughly remove all rust or roughness from the rims. This can be done with a scraper made from an old file. After the rim is polished bright with emery cloth it should be given a coating of rim



THE FUEL TANK SHOULD BE THOROUGHLY CLEANED OUT BEFORE PUTTING THE CAR INTO COMMISSION

paint. Rusty rims raise havoc with the inner tubes and also make it difficult to remove or install the tires in event of damage.

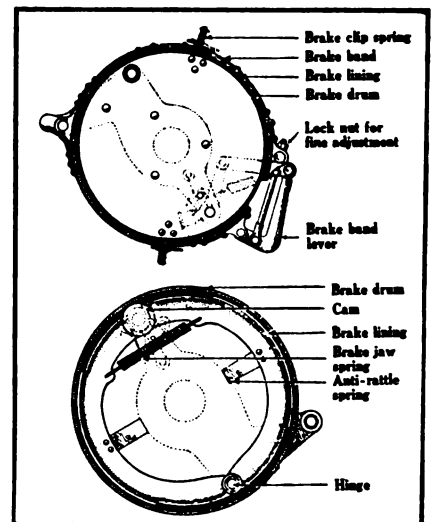
Before giving attention to the various points on the chassis it will be well to inspect the various power plant auxiliaries, such as the carburetion, cooling and lubrication system. It is well to take the carburetor apart and clean it out thoroughly because after a season's use considerable sediment will be found in the float chamber. The pipe between the carburetor and gasoline tank should be uncoupled at both ends and cleared out by forcing a stream of compressed air through it. The filter screen or sediment bulb at the bottom of the gasoline tank, providing that this is a gravity feed system, should be drained and if the screen can be reached it should be removed and cleaned. It will also be well to drain off the stale gasoline from the tank as this can be used very well for cleaning the various parts of the mechanism. When the gasoline tank is empty swab out the interior thoroughly with a soft cloth tied on the end of a stick. This will soak up any water or dirt that might later cause trouble by getting into the fuel pipe or carburetor. The oil pan or sump forming the bottom of the engine crank case should be removed and thoroughly cleaned out, especially if oiling is by the constant level splash system. The filter screen on the pump intake should be cleaned thoroughly and the inside of the crank case thoroughly flushed out with kerosene. Some kerosene should be put into the cylinders, through the spark plug holes or valve caps

and the engine turned over briskly for several minutes with the hand crank. Even if a self-starter is fitted it will be better to turn the engine over by hand. The kerosene that has been put into the cylinder cuts out the gummed oil, and cleans out the accumulations behind the piston rings and is of material benefit. Before reassembling the spark plugs or valve caps it would be well to put in a small quantity of cylinder oil in each cylinder to provide lubrication for the first few minutes the car is operated. The crank case should be filled to the proper height with the highest grade cylinder oil, and in this connection it would be well to note that a heavier grade oil can be used to advantage during warm weather than during cold weather.

The water cooling system should be flushed out to make sure that there is no sediment in the radiator passages or water jacket. The best way to clean out the radiator is a solution of washing soda in hot water. The entire cooling system is filled with this liquid which is allowed to remain for several hours. After it has had an opportunity to eat away the rust and dissolve incrustation, flush out the radiator and water jackets with clean water under pressure, if possible. Some types of engines, especially those using the latest block casting, have removable cylinder heads or water jacket plate that makes it possible to insert a scraper into the water space and clean the rust deposits off the cylinder walls by mechanical means. Very weak solutions of acid have also been used in the cooling system to clean out the scale, but one always takes a chance of having a weak soldered joint made even weaker because of chemical action. Examine the rubber hose forming part of the cooling system carefully to make sure that these are in good condition and tighten up all of the hose clamps. If there are many oil pipe connections it will be well to take these out or if fastened in place so that this will be inconvenient, uncouple both ends and clean out with compressed air, or by running a wire through them. The ignition system seldom needs attention, if the proper precautions are taken when the car is stored away. The storage battery of a battery ignition system is usually removed from the car when it is put out of commission, and given attention during the months when the car is not used. This attention consists of charging to full capacity and

discharging at least once a month and to keep the height of the electrolyte above the plates by the addition of distilled water.

Next to the engine the clutch should receive attention. The care needed depends entirely upon the type of clutching elements used. If it is a multiple disc type running in oil the oil should be drained out and the supply replenished with new. If it is a multiple dry plate type, or a three-plate type it does not receive much attention while in use and as there is very little that can happen to clutches of this type, and the only attention they will require is cleaning them out and going over the various adjustments for spring pressure, clutch throw-out, etc. No oil is used in clutches of this pattern. If the clutch is of the cone type, examine the leather facing. If this appears to be hard, rough it up with a fine hack-saw blade or a similar tool and then apply a coating of neatsfoot oil which is allowed to soak into the clutch leather thoroughly. The effect of the oil is to soften the leather and make the clutch easier acting. If, at the other hand, the cone clutch has been slipping slightly and the leather appears to be very oily upon examination, it may be well to absorb some of the surplus oil by means of fuller's earth or borax powder. The



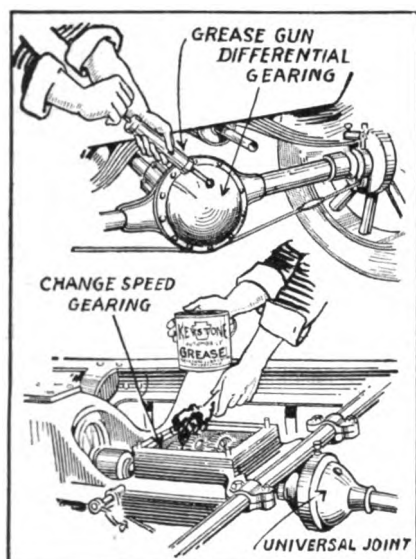
THE OVERLAND BRAKES ARE TYPICAL. THE PARTS OF THESE IMPORTANT CONTROL MEMBERS ARE SHOWN CLEARLY

change speed gearing should be cleaned out before replenishing the supply of grease or oil the various gear teeth should be examined to see that they are not burred over and that the shifting forks or the sliding gear members do not bind



on the shaft on which they run.

The various points on the chassis then demand attention. Starting at the front of the car the front wheels should be removed, the bearings and hub interiors thoroughly cleaned and fresh grease inserted. If the bearings are of the cup and cone ball



DO NOT SPARE THE GREASE WHEN GETTING THE CAR READY

type or of the tapered roller form, care must be taken in readjusting the bearing parts to make sure that they do not bind as the wheels should turn freely when jacked up and yet not have any lost motion. Every joint on the steering linkage including those on the tie-bar joining the steering spindles and the drag link should be examined for signs of weakness or lost motion. As the control system is the vital part of the car no lost motion should be tolerated in the steering system. The rear axle is somewhat more complicated than the front one as there is a differential and driving gearing to be examined, as well as the propeller shaft and universal joints. The rear wheels are also provided with brakes which should be examined and adjusted. If the axle is a "full-floating" one the wheel can be easily removed. The interior of the hub should be cleaned out and new grease put into the bearings. The brake bands, both internal and external, should be cleared of oil deposits and adjusted and if the brake lining is worn badly it will be well to supply new friction material. The differential and drive gearing in the center of the axle housing can be flushed out and new grease supplied. If the axle is noisy or produces grinding sounds while the car is in operation it indicates that the

bevel driving gears are not properly meshed and should be readjusted. A deep grinding noise indicates that the gears are meshed too tightly, while a lighter combined grinding and rattling noise shows that the gears are not meshed deeply enough. The covers should be removed from the universal joints and these also repacked with lubricant.

There are many points on the chassis which are oiled by grease cups, such as the various control lever supporting brackets, spring shackles, brake rod supporting guides, etc. Most of these are located at relatively inaccessible places, so it will be well to remove these grease cups, stick a wire into the oil hole to clean it out, fill the grease cups several times and screw them down each time to make sure that these neglected bearing points receive oil. It is also well to pry the spring leaves apart and put oil or graphite grease between them. All the nuts, bolts, and various fastenings throughout the chassis should be gone over carefully. There are a number of odds and ends that can be done, such as cleaning out the magneto distributor and contact breaker if that form of ignition is provided or removing the oil from the battery timer of other systems. All the wiring of the ignition, lighting and starting systems should be traced to make sure that there are no worn spots in the insulation and that the wires are properly fastened to their respective terminals. Other odd jobs, such as tightening the fan belt, the generator driving chain, cleaning the brushes and commutators of the generator and starting motor, cleaning and resetting the points of the spark plugs will suggest themselves to the careful workman, though, of course, the procedure will depend upon the type of car. After the chassis parts have been thoroughly lubricated the engine should be started and car run about at slow speed for five or ten minutes to make sure that everything is working properly before the car is delivered to the owner or operator.

How to Arrange and Equip the Shop for Automobile Repairing

VICTOR W. PAGE, M. E.

The average pit is $4\frac{1}{2}$ feet deep, 3 to 4 feet wide and 10 to 11 feet long. They should be lined with heavy planking and provided with stairs to permit the workmen to go in and out of the pit with ease. The

edges of the pit should be sharply defined by a surrounding frame of 2 by 4 scantling, having a triangular end to act as a guard to prevent the wheels of the car rolling into the pit when a car is being put in place. Easily detachable sectional covers should be used when the pit is not employed. It is not always convenient to provide a pit and a simple pair of runways then makes it possible to raise the front or rear end of a car sufficiently so that the underneath parts may be worked on without difficulty though not so easily as from a pit.

The average small shop will find a portable crane and chain falls, such as shown at Fig. 7 of marked advantage, as this makes the handling of the heavy parts of an automobile possible by one workman. The part may be conveyed to any part of the shop after it is removed from the chassis. This device is equally handy for installing such heavy units as the power plant, gearset, etc.

The amount of machinery used in automobile repairing depends entirely upon the character of work the shop caters to. The requirements of the average small shop will be met very well by installing a sensitive drill press, an emery grinder and a 16-inch screw cutting lathe. If all classes of work are to be attempted, a small shaper will be found very

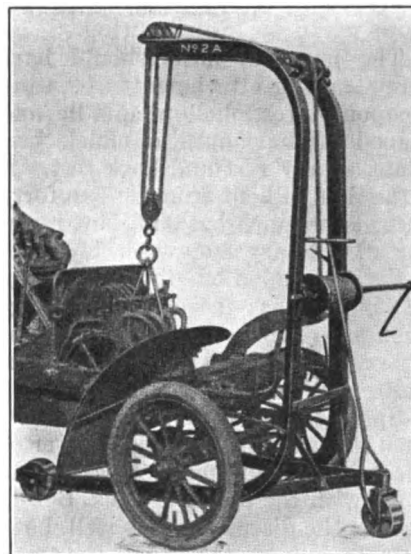


FIG. 7.—A VERY HANDY DEVICE FOR THE AUTO SHOP

useful as much of the work that is done on a milling machine, such as key seating, gear cutting, shaft splining and squaring, etc., may be done on the shaper, which is a less costly machine tool and which also uses cutters similar to lathe tools that can be easily forged up



and ground to shape by any smith.

In all automobile repair shops, regardless of size, the lathe is always the most important tool and one good-sized machine of this kind should be included in the equipment of any repair shop worthy of the name. The lathe and attachments is practically a machine shop in itself as very efficient attachments may be obtained that will permit the mechanic to do milling, gear cutting and internal and external grinding on this universal machine tool. Drilling may be done in a lathe without changing it in any way, as a drill chuck may be easily inserted in the headstock. About the largest part to be handled in repairing automobiles would be an engine flywheel, as far as diameter is concerned and the longest piece will probably be a six cylinder crankshaft or axle shaft. It is not desirable to install a lathe capable of swinging 20 inches in order to have a machine available for the rare jobs because very good results may be obtained by using a gap bed lathe which can be purchased at but slight extra cost over that of the regular tools. This form is shown at Fig. 8-B. It is well to remember that small work can be handled in a large lathe much easier than large pieces can be turned in a small one, and where the funds permit the purchase of only one tool it will be economy to install a substantial machine of 16 or 18-inch swing.

The practical lathe should have screw cutting attachments, elevating compound rest, hollow spindle and a good auxiliary outfit of chuck, face plate, steady rest and back rest. A lathe that will cut from four to forty threads per inch has sufficient range for all ordinary shop work. If a drill press is included one that will swing 24 inches has been found large enough to handle nearly all parts of automobiles that are apt to need repairs very often.

Space is not available to discuss such items as machine shop power or the general equipment necessary to work with the machine tools. Before closing the discussion it is well, however, to enumerate some of the small tools, measuring appliances and miscellaneous devices to facilitate repair work that can be included to advantage in the repair kit if automobile work is attempted. A list of hardware stock and repair shop supplies is also appended for the guidance of one just starting in the auto repair business. It is well to state in connection with these lists, that a use will be found for all of the tools and

supplies enumerated in the run of ordinary repair work, though many of the stock items need only be purchased as needed, if they can be readily procured. In a shop remote from large cities it will be found advisable to carry most of the stock enumerated, if prompt service is given to the motorist.

Electrical Equipment

Voltmeter, ammeter, hydrometer or hydrometer syringe, acid bottle, electrolite crock, distilled water carboys, torch for lead burning, storage battery charging means.

Tire Repair Material

Vulcanizer for casing, molds for same. Tube vulcanizer, stock of cement, rubber stock, fabric, patches, etc. Tire irons, jacks, air pump, extra valves and valve parts, air compressor or powerful hand pump.

Repair Shop Furniture

Special jacks, trestles and trucks as needed, oil and gasoline tanks, small tanks for kerosene, cutting oil, etc., oil cans and

breast drill, valve seat reamers, valve head truing cutters, hand drill, belt punch, ratchet drill or "old man", wood working tools, hacksaw frame and saws—Gasoline blow torch—spring winder, chassis spring spreader, bearing and carbon scrapers, soldering iron, wire scratch brush, putty knife. Sets of taps and dies—S. A. E. Standard, American Standard, Briggs pipe sizes; metric standards Taper and Straight hand reamers. Set of number drills.

Measuring Tools

Machinists' scales, 2-inch, 6-inch and 12-inch. Small and medium machinists' triangles, carpenters' square, caliper rule, 6-foot folding rule; combination square and protractor; spirit and cross levels; external micrometers, one two and 6-inch with extension pieces, internal micrometer with extension pieces; thread gauge—external and internal calipers, spring dividers.

Repair Shop Supplies

Hardware and raw materials, iron and steel bars as needed, drill rod, sheet iron, brass and copper, tinned iron sheets, tool steel for machinery tools, key-stock in bars, shim copper or brass; cored bronze bars for bushings, babbitt metal ingots,

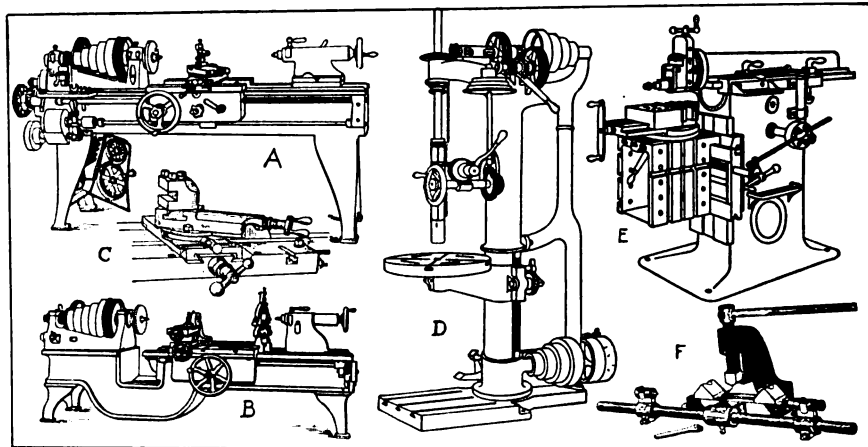


FIG. 8.—PRACTICAL MACHINE TOOLS FOR AUTO REPAIRING. A—SCREW CUTTING ENGINE LATHE. B—GAP BED LATHE. C—COMPOUND REST FOR LATHE. D—BACK GEARED DRILL PRESS. E—SHAPER. F—SHAFT STRAIGHTENING PRESS.

grease guns, covered cans for waste, oily rags and rubbish; pails of sand or fire extinguisher, water hose, sponges and chamois; chain hoist or portable crane, brazing forge, autogenous welding outfit.

Small Tools

Machinists' Ball Pein Hammer— $\frac{1}{2}$, 1, 2 lb. head. Straight pein hammer, 4 oz. head—rawhide mallet—wooden mallet—lead hammer—ratchet handle socket wrench set—small, medium and large Stilson pipe wrenches—small, medium and large monkey wrenches, adjustable end spanner wrenches; set of double end "S" wrenches to fit all standard bolts and nuts—socket wrench for spark plugs—hand vise—combination pliers—side cutting parallel jaw pliers—anti-skid chain pliers—cotter pin pliers—piston ring expanding pliers—tinners' snips—heavy shears—bolt cutter—small screw driver (jewelers'); small, medium and large screw drivers; T-handle, square shank "Bulldog" screw driver. Complete set of files, round, three-square, square, half-round and flat in mill, bastard and finishing cuts. Complete sets of drifts, chisels and punches. Cotter pin puller—scribers.

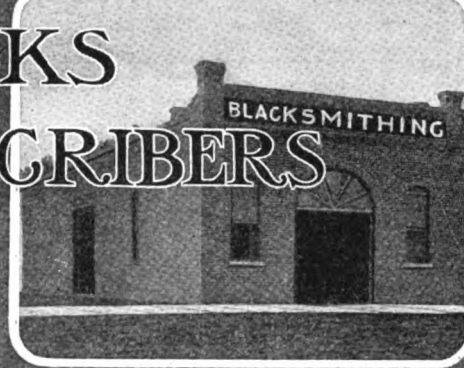
Miscellaneous Tools

Wheel pullers, valve spring lifters,

copper and iron wire, piano wire for springs, solder and spelter, steel and brass tubing, annealed copper tubing for gasoline and oil pipes, copper and iron rivets and burrs, punched iron washers, bolts and nuts, split pins and lock washers, cap screws, stove and carriage bolts, wood screws, lag screws, nails, brads, tacks. Woodruff keys and cutters, standard $\frac{1}{8}$ -inch brass pipe and fittings, such as elbows, tees, unions, petcocks, etc.

Fine, medium and coarse emery; crocus, ground glass; crocus and emery cloth; sand paper. Lard oil for cutting, drilling and tapping. Lubricants of all kinds; cylinder oil in light and medium grades, cup greases, rear axle and transmission grease. Sheet felt and felt washers, sheet fiber, heavy brown paper and light cardboard for packings, sheet asbestos, Mobiline for packings. Sheet rubber packing, asbestos cord, hemp and candle wicking. Rubber tubing for gas lines, rubber water hose and hose clamps. Assorted copper-asbestos gaskets and packings for popular cars, such as Ford, Overland, Buick, etc. Spark plugs, metric, $\frac{1}{2}$ -inch and S. A. E. Standard. Dry batteries and connectors, aluminum solder and flux, sheet celluloid for top windows and electric cable.

TIMELY TALKS WITH OUR SUBSCRIBERS



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GOOD GOODS SOLD CHEAPLY

If you purchased a gas engine, used it for a month or two, and then found that it was not large enough for your growing business and you decided to sell it—that engine, though used for a very short time, would be second hand. In reality it would be a better engine because the few weeks' of running would naturally take out some of that stiffness that is present in all new machinery. Nevertheless the engine is second-hand and you cannot expect to get as much for it as you paid. Suppose the same thing of any other tool or machine in your shop; you would have to sell it at somewhat less than you paid and it would enable some lucky smith to purchase a machine practically as good as new at a bargain price.

There are lots of such machines to be had—machines, tools and items of shop equipment that have proven too small for growing businesses. The logical place for the sale of such equipment is in the Wanted and For Sale columns of "Our Journal." If you have any such machines to offer for sale—if you want to purchase any such machines for your shop—use the Wanted and For Sale columns. The cost of such an advertisement is so small as to be almost nothing compared with the number of shop owners who read THE AMERICAN BLACKSMITH.

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When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon him showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

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IN THIS ISSUE

This issue of "Our Journal" devotes considerable space to business and accounting—subjects which a few years ago were considered very much in the same light as some writers consider horsehoeing—that of a necessary evil. For years the average smith, when considering the matter of going into business for himself, thought principally of his ability as a smith and very seldom, if ever, considered his ability as a business man to be of any importance. The craft is beginning to realize, however, that there is considerably more to blacksmithing than simply operating a blower and pounding on an anvil. There are so many chances for the smith's dollar to drop into a crack and disappear while on its journey from the customer's pocket to the smith's safe that the blacksmith must indeed, be a shrewd business man to see that he gets all that is coming to him.

The labor and time element enter into the final cost of blacksmithing work to a very large degree. It is therefore necessary for the smith to be especially watchful to insure his getting fair returns for his time and labor. The cost of material is seldom the rock upon which a business goes to pieces. Time and labor cannot, however, be measured with a yard stick or a rule and these elements are therefore generally left very much to the smith's ability as a guesser. If the smith happens to be good at guessing, he may guess himself into a fair profit, but if he is a poor guesser, he will not get the price nor the profit to which he is justly entitled.

There is a real reason for books and bookkeeping methods and accounting systems in the blacksmith shop just as there is in any other business. The only reason any smith or any man has for being in business is for the profit that he will make out of it. You nor no one else can tell anything about profits, prices or losses unless you keep books. Is there, then, one real reason why the accounting end—the most important department of the smithing business—should be neglected?



A SPRING TONIC

Many a Smith has found the Percentage of Overhead swelling and growing these many months. A decrease in the number of horses shod doesn't increase Shop Expenses but it does increase the Percentage of Overhead that must be charged to each job. And the same is true in the case of Wagon and Carriage Repairing, Implement Work and General Smithing—a decrease in the number of jobs increases the Percentage of Overhead unless you are able to decrease the Cost of Doing Business in proportion. One way of reducing that Swelling of Overhead is illustrated above. The more lines of work done in the shop, the smaller will be the Percentage of Overhead. Auto and Tractor Work are legitimate lines for the General Smith. He should do the work. He is entitled to both lines. He's the right man for the job—agree manufacturer, dealer and owner. It's up to the smith—It's up to YOU to decide.



HUNTING FOR PROFITS.....by G. J. GRIFFIN

WHAT is it that is back of all the complicated fabric of business? Profit. That is the reason for the existence of the so-called Trusts as well as the little peanut and fruit-stand on the city's street corner. It is the reason you are in business. Profit is what makes you pound iron and do the many other things that you work at in your shop. Profit and the things, comforts and advantages it will enable you to have is the real reason back of your business efforts. Therefore a hunt for profits would seem to be the most vital subject to a business smith.

And real hunting is what it seems like at times, with the "game" that we are trying to "bag" just about as elusive as any rabbit, deer, pheasant or anything else that we may have attempted to "get" at one time or another.

Figuring on a Profit

Sooner or later every business smith takes his little pencil and attempts to figure out where his profits are or why they aren't bigger. When he does find a profit balance on his books, he marvels at its small-

ness. And when he cannot find a profitable difference in his figures, he wonders where the elusive imp of profit has gone.

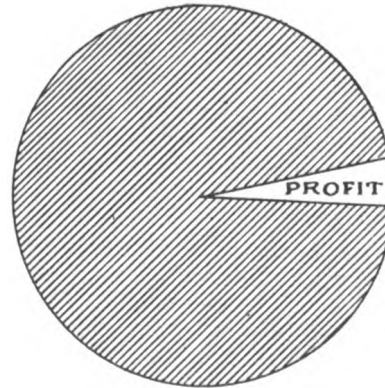
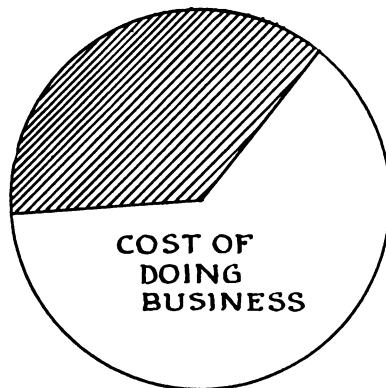
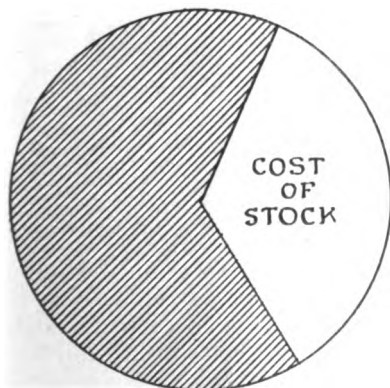
It is puzzling to figure on a profit and then to have your figures at the year's end show a loss. When a man adds up his accounts at the end of another year; totals the amount of business he has done; figures on the profit he should make; adds up his expenses and what he has paid out and then sees that the difference between the sum paid out and the sum taken in, is not what he expected it

would be, he wonders where the trouble lies.

As a general thing the solution to the problem may be expressed in just a few words, i.e., Cost of Doing Business. The average smith shop owner doesn't know what his cost of doing business really is. He bases his selling price and profit on what he thinks they should be. But strange to say, these items are seldom what they should be, and often are not what they are expected.

Serving the Pie

Suppose, for example, that one complete circle represents Selling Price. Or suppose we illustrate the example with a pie that has been sent in by our neighbor, Mrs. Selling Price. Mr. Cost of Stock, Mr. Cost of Doing Business and yourself, Mr. Profit, are sitting at the table waiting for a piece of Mrs. Selling Price's delicious pie. Mr. Cost of Stock has to be served first and you give him a good liberal portion, as he is calling for a pretty big helping these days of advancing costs. Then comes Mr. Cost of Doing Business and although you do not feel like giving him a big piece, it takes



SUPPOSE ONE COMPLETE CIRCLE REPRESENTS SELLING PRICE, AFTER STOCK COST AND COST OF DOING BUSINESS ARE TAKEN OUT OF THAT CIRCLE THERE IS A SMALL WEDGE LEFT CALLED PROFIT



a very large helping to satisfy him. And lastly you help yourself to a portion of that pie. You find your portion a small, thin, wedge-shaped piece, not anywhere near enough to satisfy your appetite, but—there



"IT IS PUZZLING"

isn't anymore to the pie, so you are compelled to be satisfied, in fact, you must content yourself with the thought that you are fortunate there is any at all for you.

Why is This?

Now what is it that makes your portion of the pie so small?

What is it that eats the heart out of your business and shows but a small and insignificant return for your efforts?

Usually the whole difficulty can be laid at the door of Overhead or the Cost of Doing Business.

The average smith forgets or does not consider his Overhead. When he figures on it he usually figures it too low.

Cost of stock, plus ten or fifteen cents for coal with twenty-five cents added for profit is not correct cost accounting.

Taxing customers all the traffic will stand when you are busy and soliciting trade at cost or less, when times are slack, is not correct business.

Cost of stock, depreciation, heat, light, power, rent, wages, repairs, losses, and every other expense must be considered in connection with every single job turned out. If you do not add all of these items into the selling price, you have not covered your costs, and are doing work at an actual loss.

Another Reason

Some smiths are apparently figuring on a profit, considering a correct overhead and yet wondering why they do not actually get the profit they figure on.

For example, some smiths (and other business men do the same thing) figure their profit on the basis of cost. When actually, all figuring should be based on selling price as the starting point. Everything, cost, expenses and profit must come out of the selling price. Therefore, the correct basis of cost accounting is on the basis of the selling price. How any other figuring may work out to the loss of the smith may be illustrated as follows:

A smith bought some automobile supplies for which he paid fifty cents each. The usual profit on the goods is fifty per cent. So in marking the selling price he made it seventy-five cents. "For", he figured "50 per cent. of 50 is 25 and 25 cents added to fifty cents equals seven-fifty cents."

Did he actually make a profit of fifty per cent? No, he did not.

His actual profit was $33\frac{1}{3}\%$. His profit was 25 cents which is $\frac{1}{3}$ or $33\frac{1}{3}\%$ of 75 cents which is the selling price.

Take, for example, a pair of hounds. Suppose these cost fifty cents. Labor is about 75 cents, painting 20 cents and freight 20 cents. This makes the actual cost just \$1.65. Suppose now that we figure our overhead at 25% and another 25% for profit. Figuring we get 25% of \$1.65 or 41 cents and \$2.06 for cost plus overhead. And 25% of \$2.06 or 51 cents and \$2.57 for the selling price.

Now have we actually gotten a 25% profit? And have we actually allowed a 25% overhead?

Our overhead is figured on the amount of gross business done dur-

adding up all the money received during the year.

Now, let us see what our profit actually is, based upon the above facts as generally agreed upon:

We get \$2.57 from our customer for the pair of hounds. If our overhead is 25% of our gross business, the overhead cost on this job is one-fourth of \$2.57 or 64 cents, leaving \$1.93 for cost and profit. We have figured the actual cost of material and labor as \$1.65, so \$1.93 less \$1.65 leaves us 28 cents as our profit. And 28 cents is a little over 10%—we have not made a profit of 25% as we figured originally.

Take the little spoke, for example. Material will cost all the way from five to ten cents. Suppose we figure eight cents for convenience. Labor at thirty cents an hour, will amount to about twenty cents; and five cents worth of paint will cover. This gives us a total of thirty-three cents as actual labor and material cost. Overhead at 25% would amount to nine cents or forty-two cents and another 25% for profit makes the profit twelve cents and the selling price fifty-four cents.

The correct figures, however (on the above basis), are fourteen cents for overhead and seven cents for profit

The Correct Way

Let 100% represent the selling price, and if 25% is the overhead, 75% will represent the cost and profit. If we desire 25% profit, 75% less 25% equals 50% which represents the cost. In the case of the spoke, this 50% equals thirty-three cents which is the total labor and material cost. Therefore, to get the



"OUR NEIGHBOR HAS BROUGHT IN A PIE"

ing the year. If this figure is found to be 25% then it is incorrect to figure 25% of the cost as overhead, for your yearly figures have shown that 25% is your percentage of overhead based upon the total amount of business done. Not upon the yearly costs—but upon the total shown by

selling price or 100% we multiply by two making 66 cents the selling price instead of 54 cents as in the other method. The correct method gives us $16\frac{1}{2}$ cents profit and $16\frac{1}{2}$ cents for overhead.

An Explanation

If in the method of figuring on



the basis of cost, your overhead is not 25% and you only desire to get a profit of 20% the method is nearer correct than the foregoing demonstration has shown. However, it is well to remember that when 25%



"PROFITS ARE SHY"

of the cost is added to the cost, you make only a profit of 20% on the selling price. However, it is best to figure safely and intelligently on actual percentages and then if your yearly totals do not figure out correctly, there must be a real reason and not a reason put down to the difference in figuring.

Price Cutting

Does it Pay?

WILL BISHOP.

There's about as much comfort in trying to do a prosperous smithing business in a town where smithing prices are shaved, juggled and hacked, as there is in listening to a man who has no musical training trying to play a cornet. And when once the price-cutting bug gets its hooks into the broad healthy back of a prosperous community of smiths its about as hard to shake off as a wet sock. And all in all, there's about as much sense and reason for cutting prices as there is in trying to enlist as a horseshoer in the navy.

All of which will be considered quite apropos after you have read my little story.

There were four shops in our town. Joe Porlen ran one of them, I ran one, and the other two were conducted by men who were friends of both of us. In fact, we were all the best of friends, each getting enough work to do, and all getting a fair price for everything until the price cutting bug got his hooks into the back of our community.

One morning a customer halted a

sorry-looking team in front of Joe Porlen's shop and shouted for Joe.

"G'morning, Mr. Snoops," hailed Joe as he came to the door. "What can I do for you?"

"H'lo, Joe," returned he of the sorry team. "I jes' wanted to see y' about shoein' my team. What're y' chargin' fer shoein' now, Joe?"

"Why, same as ever, Mr. Snoops; three dollars for the team," replied Joe.

Snoops sent a stream of tobacco-juice over the dash-board, slowly pulled up his lines, and whined out: "I like yer work, Joe; but y'r a leetle high. I can git it done cheaper."

Joe laughed, thinking the old man was joshing. "I guess not in this town, Mr. Snoops," he said. "A dollar and a half a head is what we all charge for the size of shoes your team wears, and we certainly couldn't cut the price now, seeing that shoes have raised in price."

"Wal, I know one man thet's satisfied with less'n one-fifty a head," said old man Snoops, his stubby chin working like a wrinkly old bellows as he worried a huge "chaw" of Granger Twist, with his five or six snags of teeth. "Jed Smith'll shoe 'em fer a dollar and a quarter a piece. If you can't shoe 'em fer that, I reckon I'll drive on up and let Jed do the job."

"All right, Daddy," grinned Joe. "I can't do it for that, and I don't think Jed will. Sorry."

The old man clucked to his team and drove on, and Joe went thoughtfully back into the shop, his mind lingering doubtfully on what the old man had said. He didn't really think Jed Smith was cutting prices; still he might be; he had heard it rumored that Jed was not entirely above it. Oh, well, let old Snoops go. He was slow pay, anyway; and if Jed didn't charge him full price he wouldn't lose so much when the old man failed to pay.

Joe tore into the work on hand, forgetting about the price-cutting charge against his competitor, and was singing lustily when a stranger came into the shop.

"Howdy do," said the stranger. "Are you the proprietor?"

"Yes, sir," said Joe.

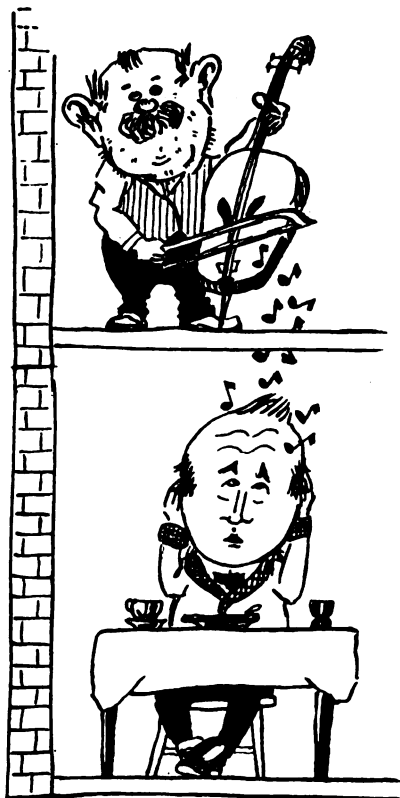
"My name is Haulem. I'm going to do a lot of work here in your town in the teaming and grading line. I have twenty teams at work now, and some of them need shoeing. You've been recommended to me as a good shoer, and I'd like to have

you do my work. What is your price for shoeing?"

Feeling good over the prospect of new business, Joe gladly quoted his price for shoeing: "One dollar and a half, per head, for shoes up to number four's," he said; "and two dollars, per head, for number fives, sixes and sevens. That price is for either plain or calked shoes."

"That's too bad," deprecated the stranger. "I had wanted you to do the work; but I guess I'll have to go up to your competitor, who will do my shoeing at reduced rates if I agree to give him all my work. Most of my horses are big fellows and it takes big shoes for them. I can't afford to pay two dollars a head to have them shod. If you can meet Mr. Smith's price of one dollar and a half a head for all my horses, regardless of shoe, I'll let you do all my work, blacksmithing as well as shoeing. What do you say?"

There it was again! Two men in one day claiming that Jed Smith, his competitor, was cutting the price of shoeing. Joe was mad. He didn't wait to investigate the truth or falsity of the charge, even though



"IT'S THE OVERHEAD THAT TROUBLES"

one of Jed's accusers was an entire stranger, and the other was known to him as a "skin" and a man to be watched.

"All right, Mr. Haulem; I'll meet

his price," snapped. Joe. "I reckon if Jed can shave that close I can. If he wants to do cheap work I'll give him his belly full, and stay in the game till it gets dangnation empty!"

Agreeing to send in a team to be shod that day, Haulem left the shop well pleased with his scheming for cheap work. Joe was good and hot under the collar. Themorehethought about it, the hotter he got. Going into his paint-room, selected a small striping-brush and a can of black paint. Next he found a good sized square of card-board, and on it he painted—readably, if not artistically the following:

CUT-RATE HORSESHOEING!

0 to 4.....\$1.00
5 to 7.....\$1.50

Either plain or calked.

ALL WORK GUARANTEED!!!

"There!" growled Joe, as he tacked the fresh sign on the front of his shop, where all could read it from the street. "I reckon I'll show 'em Joe Porlen won't take the dirty end of it from no under-cutting snake-in-the-grass!"

That started a fight that before peace was declared, was some scrap! In two weeks there were no two smiths in town who would speak to each other, and there had been two fights—fist fights—amongst us. Joe Porlen, with the bit in his teeth, was shoeing horses from 0's to 7's for seventy-five cents per head. Joe swore he would shoe them for nothing if we met his last cut. Well, we met him, and he was as good as his word. He stuck out a sign on the front of his shop, bidding the public come in and get their shoeing done gratis, at the same time announcing a big cut in all standard lines of blacksmithing. As he said, he was "Going the whole hog!"

Of course, you've all guessed that this condition of things didn't last long. It couldn't. To use Joe's phrase, we all went "the whole hog;" and in so doing, we all went broke. When our jobbers saw what fools we were making of ourselves, they immediately demanded payment of all bills, and when we had paid them they promptly put us on a cash basis, sending all goods, no matter how small the order, to every mother's son of us C. O. D.

In four months' Joe Porlen and I went jam smack to the wall and were closed out of business. Jed Smith and our other competitor,

each having some real estate to fall back on, managed to patch up the wrecks of their business after Joe and I were forced to leave town to look for a job. But, at that, they have not to this day been able to re-establish the old-time prices that prevailed before Joe started in to "Show 'em."

Where Willie Wigger's Profit Went

BY THORNTON.

Some smiths know as much about business booking-keeping and cost accounting as some congressmen know about preparedness and the catching of an outlaw or bandit. So perhaps a little story and demonstration on why Willie Wiggers did not get the profit he expected, may be very apropos, as the high brows say.

Willie sat at the kitchen table with his boots off, a pencil in his hand and a puzzled frown on his brow. He had figgered all over Maw's supply of butcher paper and was just about to commandeer Willie, Jr.'s school pad when his friend Joe Jugger came in. After the usual preliminaries of "Hello" and so forth and an explanation by Willie as to why his brow wasthusly and sorely corrugated, Joe opined that he could help him.

"Now let's see," began Joe, "what are your expenses for the year?"

"Five hundred and seventy-eight dollars and thirty cents is what I figger," returned Willie.

"And your total business for the year was something over seven thousand dollars—seven thousand three hundred and ten dollars to be exact. Now then does that \$578.30 include wages or salary for yourself as proprietor? No? Well then it's not your total overhead. Mistake number one. You must be worth at least eighteen dollars a week. That amounts to another nine hundred and thirty-six dollars to add to expenses making a total of \$1,414.30 in all. This is your total overhead, and if you did a business of \$7,310 last year, your percentage of overhead is very close to eighteen per cent. on the total amount of business done. Now then how have you been figuring selling prices?"

"Well, I'll show you," replied Willie, taking up a piece of paper and a pencil. "A front bolster will cost about seventy-five cents, freight will amount to twenty cents, paint ten cents and labor about two hours

at forty cents an hour. This makes a total material and labor cost of \$1.85. Now then, I've been figuring on an eight per cent. overhead and eight per cent. of \$1.85 is fifteen cents making a total ———"

"Here, here, just a minute," interrupted Joe. "You are figuring your eight per cent. overhead on costs and not on selling price as you should and as your yearly figures are based. On that basis you are not covering your overhead at all. But go on with the rest of your figuring."

"Well, then I figured on a 25% profit," continued Willie, "and 25% of that total cost of \$2.00 equals fifty cents making a selling price of \$2.50 even money. But I don't suppose that is correct according to your way of juggling figures."

"No, it is not," replied Joe. "Now let me show you just how much money you actually made on that job. You say that you charge \$2.50 for the work. Your figures show just as I figured for you that your overhead is about 18%—18% of \$2.50 is 45 cents. Your selling price of \$2.50 less 45 cents equals \$2.05 which represents material and labor costs and your profit. Your material and labor costs according to your figures are \$1.85 on this job.

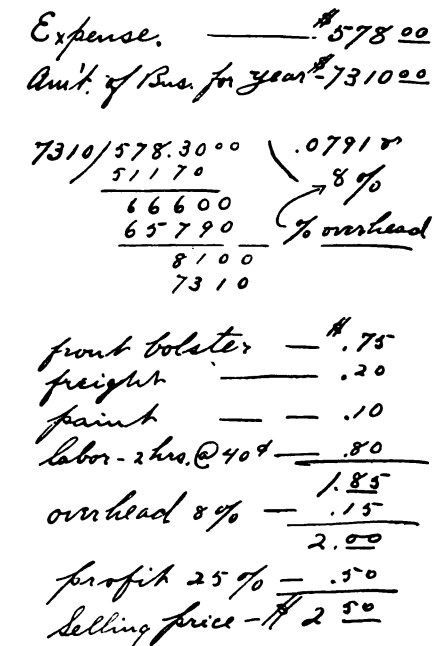


FIG. 1.—HOW WILLIE WIGGEN'S FIGURED PROFITS

This deducted from \$2.05 shows that you actually made a profit of twenty cents on the job—a profit of eight per cent. instead of 25% as you supposed.

"Now let me show you how that job of the front bolster should be



figured and what the selling price should be." And Joe took up his pencil again. "Just to simplify matters let us put down 18% equals our overhead and 25% equals profit. The basis upon which we figure is selling price, so let this be represented by 100%—100% less 18% for overhead leaves 82% which represents material and labor costs and profit. Then we figure on 25% profit, so subtracting this we get 57% which represents material and labor costs. Now if 57% equals \$1.85, one per cent. will equal 1/57th of \$1.85 or \$.03245 and 100% will equal 100 times \$.03245 or \$3.24 which is the correct selling price for that job on the basis of a real 20% overhead charge and a real 25% profit."

"Well that may be correct and all O. K." replied Willie scratching his head, "but isn't that a rather complicated, not to say difficult, way for a simple smith to figure out every-time he prices a job? Isn't there some way of figuring forward without going backward first?"

"Yes, I can show you how to simplify the matter so you will be much closer to the correct figures than you have been." And Joe put down several new figures. "Now then, if you want to figure on an actual profit of

Expense — — \$578.30
 Prop's. Salary @ \$5 — 780.00
 \$1358.30
 Unit of Bus. — \$7310.00
 7310 / 1358.30 .1801
 7310
 62730
 58480
 \$250 \$2.50 sell-price
 .18 .45 overhead
 2000 \$2.05 cost x profit
 250 1.85 cost
 \$4500 \$.20 actual profit
 20¢ = 8%
 not 25% profit

FIG. 2. — WHAT WILLIE WIGGEN'S ACTUALLY MADE ON THE JOB

25% on the selling price take 33 1/3% or 1/3 of your cost and add it to your cost to make the selling price. If you add 33 1/3 per cent. to your cost price it will amount to 25% of your selling price. And, in the same way, in order to simplify figuring, add 33 1/3% or 1/3 of your material and labor cost in order to get the

18% which you figured was your overhead and which was figured on the basis of gross business. Now doesn't that simplify the matter and come pretty close to the correct figures? In the case of the front bolster it figures out like this: bolster, 75 cents; freight, 20 cents; paint, 10 cents, and labor, 80 cents, or \$1.85 in all. Overhead at 33 1/3% or 1/3 is 62 cents, putting the total up to \$2.47. Profit at 33 1/3% or 1/3 is

18% = overhead
 25% = profit
 100% = selling price
 18% = overhead
 82% = cost x profit
 25% = profit
 57% = cost
 57% = \$1.85
 1/57 / 1.85000 .03245
 1.71
 1.40
 260
 328
 320
 285
 35
 3245000
 \$3.30

FIG. 3.—HOW JOE JUGGER FIGURED PRICES FOR WILLIE

83 cents and makes the selling price \$3.30. Now then, that is the correct basis for you to figure your prices."

"But see here, Joe," put in Willie. "That system of yours figures in labor cost twice. You add it in on your overhead as my salary and then you add it again as labor and naturally that brings the selling price high."

"That salary of fifteen a week is simply your allowance as proprietor—surely that isn't all you are worth when you work on a job. If you do the job charge your labor at the regular rate, same as though your man did it. You aren't paying your man forty cents an hour, but then you must remember that there are times when he is not busy on a job—when things are slack. But you must pay him his weekly fifteen or eighteen dollars just the same. And when you come right down to brass tacks, \$3.30, is not too much to charge for a front bolster when using the old irons.

"Of course, Will," said Joe, in ending his demonstration in cost accounting, "you know your cost of doing business—your overhead. Another smith may have a larger or a smaller overhead and he will need

front bolster — \$1.75
 freight — — .20
 paint — — .10
 labor — — .80
 \$1.85
 overhead 33 1/3% or 1/3 — .62
 \$2.47
 profit 33 1/3% or 1/3 — .83
 3.30

FIG. 4.—HOW JOE JUGGER SIMPLIFIED THE FIGURING FOR WILLIE WIGGEN'S

to figure differently. But the main point is to figure on the basis of selling price and not on cost price. And when you are in doubt regarding the fact as to whether your selling price is correct or not figure out your percentages as I showed you in example number three and then you'll be right."

And with a hearty good-night and a wish for Willie's success in the future, Joe left for home.

The Cost of Doing Business*

The cost of doing business consists of all expenses incurred in the conduct of the business. The importance of this fact is sometimes overlooked by the owner of a business. It is very commonly overlooked by the prospective purchaser of a business. It is unappreciated by the customer.

Most of us are acquainted with the salaried man who longs for the time when he can get into business for himself, and be independent. He thinks that when that time comes he will be able to sell at a considerable advance over invoice price and thus realize a profit in accordance therewith. He thinks that being independent in business is synonymous with becoming independently wealthy.

Similarly, the farmer, desiring to move to town, thinks that the best investment for some of his accumulated wealth is a store, where he can make sales at a considerable "profit." He recalls the sales that have been made to him in the past by a merchant in the same town, when he knew that the merchant paid only four dollars for the article that was sold for ten. The retiring farmer is counting accordingly on making a similar "profit" of six dollars on such a sale; or perhaps if he is a farmer that thinks carefully, he will stop to consider that the

*Based upon a lecture by H. T. Scovill at the University of Illinois.



merchant had some expenses of operation and, therefore, probably made only five dollars on the transaction.

Profit, to such people, has only one meaning—the difference between invoice price and selling price. The trouble with the salaried man and the farmer in each of these instances is that he fails to consider

to the fact that he does not know how much he pays for hired help, telephone, stationery, taxes, insurance and other items that are paid for in cash from time to time.

In general, he might tell us that his cost of doing business consists of (a) direct cost of maintenance, (b) direct cost of operation, and (c) general expenses. He will likely

intact at the end of twenty years.

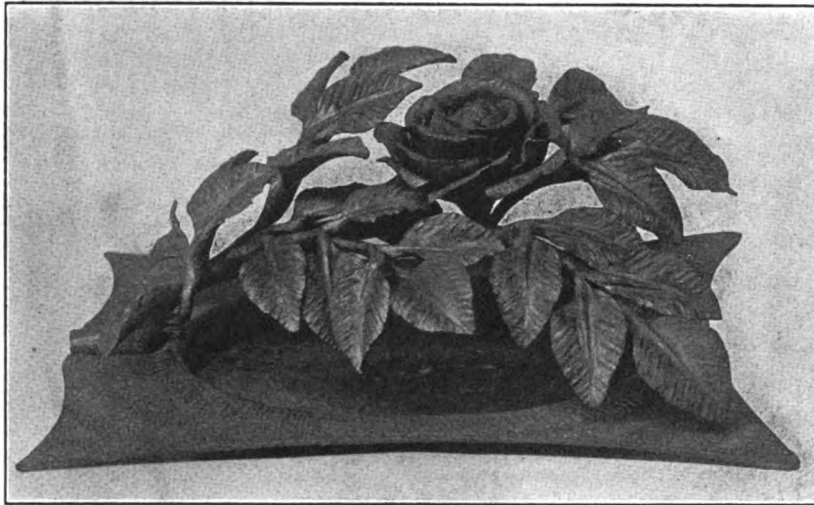
If he had thought that his original investment was not to be returned, he would have demanded a much greater yearly return. He would have demanded a yearly amount sufficient to make up for the twenty years' interest plus the principal, or \$22,000 in all. This would mean an annual amount to be received by him of \$1,100 for twenty years, not considering interest on the decreasing principal, which would tend to decrease it somewhat in the case at hand.

In the case of the shop building, the smith is not so likely to realize that his principal is not to be returned to him intact at the end of, say, twenty years. If he did, he would do exactly as he would in the case of the mortgage when he knew that the principal of the latter was not to be returned to him. The party receiving the benefit of the mortgage loan would pay the increased yearly amounts. The parties receiving the benefits of the shop—a shop is operated for the benefit of the customers—should pay the increased yearly amounts.

In neither of the cases cited above would the parties paying the annual installments, pay the increased amounts to take care of the principal which is not to be returned intact, unless the one receiving the money asked for such amounts. This is the reason so many men do not have their investments returned to them. They do not think to ask for them. The only way they could expect to have them returned is by the annual installment method. The only way to operate the annual installment method of returning the principal is to add a sufficient amount to the invoice price to cover all so-called cash expenses of the business and also to provide for the depreciation of fixed assets and a fair return on the capital, risk considered. Depreciation should be provided for in a similar way.

If depreciation is not considered, then, the cost of doing business is lowered to that extent. He, therefore, probably sells at a lower price, the "profit" being the same from year to year; but when the fixed assets require replacing, it is necessary to bring new capital into the business. This assumes that the selling price is based on cost, which is often not possible because of conditions.

The smith who calculates his selling price on a basis of gross cost, including invoice price, upkeep, de-



MR. HILLYER'S ASH TRAY AND ORNAMENTAL ROSE SPRAY

the elements that enter into the cost of doing business.

Even after these same men become owners of businesses, they will doubtless follow the path of many of their predecessors and withdraw from business financially ruined or with much less property than when they entered. There may be several causes contributing to the failure of these men. Perhaps they are poor salesmen. Perhaps they do not know how to buy. Perhaps competition is too strong, with their competitors financially able to withstand conditions for a longer period of time. Perhaps economic or social conditions are bad.

Whatever the causes might be, there is one that very often underlies one or more of the other causes mentioned. It is a faulty method of keeping the accounts of a business. This does not mean that a business cannot succeed with poor accounting methods. It can succeed in spite of them, but the owner or manager who permits poor accounting methods in his business does not have a means of pointing out the weak places in the business. He lacks the basis for constructive criticism of the business operations.

In other words, even after the salaried man has engaged in business, he does not know what it costs him to do business. This is not due

overlook the element of depreciation in stock of goods and in equipment and building, if he owns the latter.

Both of these classes of depreciation—on goods and fixed assets—are elements of cost of doing business. No man should figure that he is making a profit until he has charged into his costs an ample amount to provide for depreciation. A profit is not a profit unless it is arrived at after every element of expense and every element of income in the conduct of the business have been considered.

To illustrate why depreciation is an element of cost that should be included in fixing the selling price, we shall use the building as an example of fixed assets that the merchant owns. He invests money in the business with the intention of making a profit on the investment. He overlooks keeping the principal intact as he would in any other investment. If, instead of investing in the shop, he had invested \$10,000 in a mortgage bearing six per cent. interest annually and having twenty years to run, he would receive \$600 a year as income. At the end of twenty years he would receive the amount of his original investment, \$10,000. That is, he would receive a fair rate of income on his investment, risk considered, and his investment would be returned to him



preciation, and similar charges, usually adds a certain per cent to the cost to obtain the selling price. This per cent is added with the idea that it will be sufficient to provide for selling, delivery, and general expenses of the business, and leave a fair amount to represent interest on the total investment, risk and management considered.

The term "general expenses" may be a very broad one. It often includes a number of items which are styled "indirect costs," but which are really losses.

In this connection it might be noted that expenses of operation are not losses. A true expense is a means of making a profit. A smith cannot make a profit without incurring some expenses. It is quite possible for him to make a profit without incurring a loss. A loss, as used here, is a decrease in wealth of an extraordinary nature which is not required for the normal conduct of the business. A fire loss, a loss by theft, a loss through unpaid accounts, all are instances which tend to illustrate this distinction. There are several other elements encountered in business, similar to the ones just mentioned, which might be called expenses or losses, depending somewhat on conditions.

The per cent added to cost should provide, then, for these losses to some extent. It should provide for all legitimate losses and expenses.

The smith would be taking a great step forward if he could educate the customer to reason out for himself why it is that the margin between invoice price and selling price is not all "clear profit" going into the pocket of the smith.

An Ash Tray of Unique Design

BERT HILLYER.

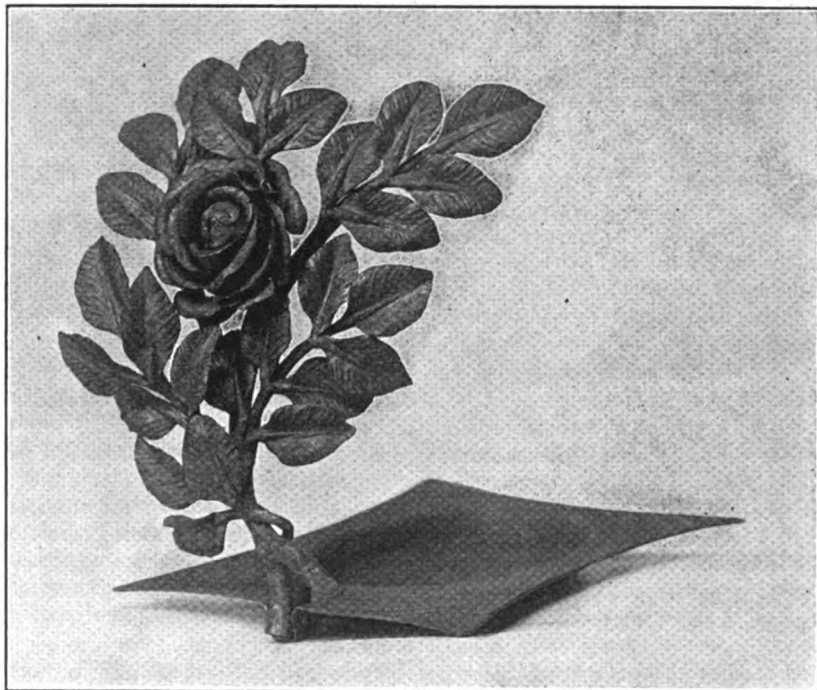
The accompanying engravings show an ash tray that is different from the usual design. Ash trays that are made open, show the ashes and the short ends of the cigars, and therefore do not make a very pleasing sight. To overcome this, the rose branch and leaves were made to form a hinge that fits into one end of the tray. This branch acts as a lid so that the smoker can raise it up when he starts and can cover up the contents of the tray when he is through smoking. It also makes a very easy tray to clean. The two photos show the same tray open and shut. There was not much care

taken in making this tray as the writer had to have it ready for a party that was going away.

Something About Borax

The name of the first blacksmith who found that a bit of borax on his iron made it weld with more certainty is not known, says an Exchange, nor who first began soldering and brazing and discovered the necessity of a flux for each case; but the importance which fluxes have in work which requires a union of metals under heat is known. The ordinary fluxes may be divided in three classes: The acid fluxes, of which borax is a type; those which

commercial borax from these masses is very simple. The contained sand, which is one-half of the whole mass, and sodium compounds such as the carbonate, sulphate, and chloride, are got rid of by dissolving the mass in water, which removes the soluble compounds and allows the sand to settle out. The remaining liquid is treated with a little more than its own weight of sodium carbonate (soda) and boiled. This is allowed to crystallise. These crystals, however, contain glauber salt as an impurity, which is got rid of by again dissolving the crystals in hot water and adding a little sodium hypochlorite. The solution is then allowed to cool slowly, so that the glauber salt will crystallise out first. When the tem-



MR. HILLYER'S WORK AS AN ARTIST WITH THE HAMMER IS EXCELLENT

oxidise as well as flux, like litharge; and those which reduce or separate out the oxygen, like cyanide of potassium.

The most common of all these fluxes is borax. This occurs in a native state, and is also made from boric acid, according to location. It came first from a salt lake in Tibet. There it is dug from the shore and shallow places in crude masses. It is purified partially by the natives, probably by dissolving it in water, allowing it to settle, and then to crystallise out. The greater part of the world's supply, however, now comes from California and Nevada, where it is found, as in Tibet, at the edges of lakes and marshes.

The process of manufacture of

perature has been reduced to about 92° F., the liquid is drawn off into another tank and the borax collected by allowing it to crystallise at a still lower temperature.

Even this is a rather crude form of borax. To obtain that which is suitable even for ordinary shop processes, it is dissolved once more in hot water and allowed to cool slowly in lead-lined tanks that are closed from the air.

The borax which comes from Italy is made from boric acid, which occurs in volcanic regions as vapours from hot springs and from smoking holes in the ground, which are probably the chimneys from underground springs. Artificial pools are made round these openings, which



are called fumeroles, and a series of tanks, each slightly lower than the previous one, are built. The fumes, or smoke, are led down so as to bubble up through the water in these tanks. This results in a solution containing at the most about two per cent. boric acid. This solution is evaporated in lead-lined or cement tanks under gentle heat. After the calcium sulphate which is in the solution with the boric acid has been deposited on the sides and bottom of the tanks, the liquid is drawn into another lead-lined tank and allowed to crystallise.

This boric acid is used to make borax by dissolving it in boiling water in which sodium carbonate has been dissolved. This solution is boiled down and allowed to crystallise in shallow open tanks. To purify, it is again dissolved in hot water with a little sodium carbonate, and then recrystallised in tight tanks as before.

By both methods two forms of borax are made: the common, or prismatic borax, $\text{Na}_2\text{B}_4\text{O}_7$, plus 10 H_2O , and the octahedral borax, which is the same, but with only five molecules of water in combination. The latter is formed by slower crystallization from a higher temperature, and is naturally the more expensive as well as the better. If it is left open to the air it will absorb moisture, and become the common form of borax.

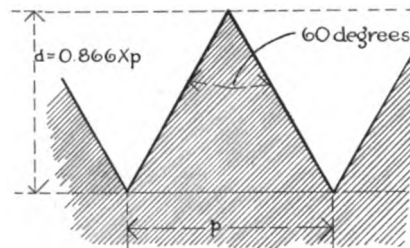
The Action of Borax

The action of borax as a flux appears to be one of melting in its own water of crystallization. When heated above a red heat, it fuses and makes a sort of glass, which will adhere to metals even up to the welding heat and higher. It is this property of coating the surface to which it is applied at a temperature below that at which active oxidation takes place, and staying there until the welding or brazing heat is reached, that gives it its value to the blacksmith.

Various mixtures of borax with other elements are used. How much more valuable they are than borax alone is difficult to determine, because the process of welding is so dependent on the personal element that a man's judgment may be influenced by things which have nothing to do with the results obtained. One of the substances mixed with borax is sal-ammoniac. This is supposed to make a compound which will restore "burnt" steel, or steel which is sufficiently overheated to make the grain coarse and crystal-

line. Sal-ammoniac is NH_4Cl . Borax contains no carbon, so it is hard to see just how the two together can be a restorative. It is true, however, that "burnt" steel can be improved in quality by heating nearly to a welding heat and hammering. If the directions with the compound call for much hammering, and if they are followed, the material will undoubtedly be improved, though the steel can not be brought back to its original composition.

Other mixtures contain iron filings as well as borax and sal-ammoniac. The value of the iron filings



SECTION OF A SHARP-V THREAD

seems doubtful; used alone, they almost surely prevent welding. It seems likely that they must burn before the welding takes place.

Sal-ammoniac by itself is used as a soldering flux. It formerly came from Egypt and other eastern countries, where it was made by the prosaic method of burning camel dung. The soot from the fires was gathered and sublimed, that is, heated until the sal-ammoniac which it contained was vaporised and the vapour condensed. In other words, it was obtained by a sort of dry distillation.

Now, however, it is made from crude sulphate of ammonium, a by-product of gas works. A ton of coal yields, beside the other substances, about 20 gallons of ammoniacal liquor. This is heated to drive off the free ammonia, and the escaping vapour is run through sulphuric acid. The resulting compound is allowed to crystallise. The ammonium chloride thus obtained is mixed with common salt in solution in hot water. When the solution cools the sal-ammoniac crystallizes out.

There are two grades. One is sold as muriate of ammonia, which is impure as compared with the other, which is sold as sal-ammoniac. This material is used for charging electric "wet" batteries, for a soldering flux, and as a part of various iron and steel cements.

As a soldering compound, it is used for copper, zinc and brass alloys, though it is used less for these

metals than zinc muriate. The latter is made on the job by dissolving small pieces of waste zinc in hydrochloric acid. The use of any of these three fluxes, borax, sal-ammoniac, or zinc muriate, is attended with the risk that the acid will not be entirely neutralised, and may remain to eat away the soldered material. To avoid this danger resin is commonly used, especially for copper round electrical machinery and installations. It is not nearly so easy to get a good job of soldering with resin as with the acid fluxes, but once made to stick, it is more permanent.

Harder materials which require hard soldering or brazing demand the use of borax as a flux; softer metals, such as lead and pewter, may require only tallow or sweet oil.

Screw Threads—2

Measurements, Standards and Cutting

Measuring Threads

One of the most convenient of the accurate methods of measuring the diameter—or rather, the pitch diameter—of a screw is by means of a micrometer specially designed for the purpose and made by one of the large manufacturers of tools. The contact parts of the caliper are adapted to fit into the grooves on both sides at once. The measurement indicated by the micrometer is the pitch diameter. With such an instrument, it may be determined with a good deal of accuracy. If one is using this instrument at the turning lathe, it will be well to settle beforehand what the pitch diameter ought to be for the thread we are going to cut. If you look near the beginning of the article, you will see that the pitch diameter is the outside diameter diminished by the depth of a thread. We may use the micrometer caliper also to test whether the thread cut by a die is correct.

Cutting Threads

The most accurate commercial method of cutting a screw thread is to use a lathe. When using a die, we have not only the errors in the die itself, but also those involved in using the die. It is judged that such errors are more likely to produce an imperfect thread than the errors involved in using a lathe.

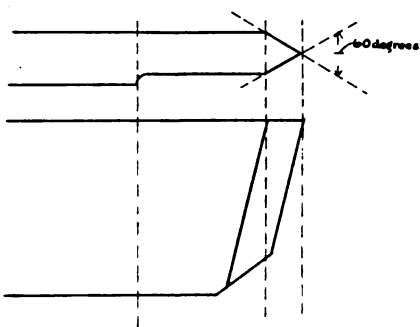
The lead screw of the lathe controls the matter of pitch. The tool post should be so managed by the lead screw that the tool is advanced along the axis of the screw being cut precisely the amount of the pitch during one complete turn of the spindle of the lathe. This is regulat-



ed by means of gears. With this matter covered, there will be no trouble due to wrong pitch, provided of course, the lathe is a good one.

The Cutting Tool

The cutting tool should have precisely the form desired for the groove of the thread. That is, the top horizontal surface of the tool should have at the cutting end exactly the shape required for the groove of the screw. If the thread to be cut is a 60-degree, V-shaped one, then the end must have the angle of 60 degrees and must also have the sharp vertex. If we are going to cut according to the U. S. S., then the



THE CUTTING END OF A THREAD CUTTING TOOL

tip end must be flattened so as to provide for the flat bottom of the groove. Note particularly that the proper shape is given to the upper horizontal surface of the tool. As the tool is to be used perpendicularly to the axis of the work, it is also important that the 60-degree angle shall be half on one side and half on the other of a central line drawn along the top horizontal surface.

The tool is to do its cutting with the top surface. Its nose may accordingly be sloped away from the work beneath the cutting edge. It is no great matter what the precise slope is. The slope away should not be too rapid, as that would produce a cutting edge but poorly supported underneath.

Fifteen Degrees is About Right

Then follow these directions: Make the top surface absolutely flat. Lay off the central line along its length. Then grind the 60-degree angle in such way that one half the angle will be on one side of this line, and the other half on the other side, with the line ending in the very tip of the angle. So far, the tool is correctly made, whether we are going to cut a V-shaped, 60-degree thread or a U. S. S. thread. If the tip is to be flattened, great care must be taken that the flat has just the right

width. There are special thread gages made which will enable the user to ascertain this.

Setting the Tool

The tool should be secured rigidly in the tool holder, in such way that the center line will be exactly at right angles to the axis of the screw blank. If it deviates to the one side or other, the thread will not be right. Then the height of the tool should be very carefully adjusted. The top horizontal surface should be exactly level and exactly in line with the axis of the work. That is, the cutting edge must come up against the work exactly half way between the top and the bottom of the blank. If the contact is above or below, the thread will be imperfectly cut with a groove of the wrong angle.

The Blank

Before cutting the thread, the portion of the blank where the thread is to be cut should be brought to the exact outside diameter desired for the thread. This direction applies to sharp V-threads and to all flat top threads.

Lubrication

The friction of the contact between tool and work should be mitigated with a suitable lubricant. An approved lubricant is one made by mixing lard oil and turpentine.

Feeding the Tool

There are two feeds necessary in cutting threads on the lathe in the usual way. One of these is carried out automatically. This is done by the lead screw. That is to say, the workman's attention can be removed from the question of moving the tool lengthwise of the work. The other feed required is perpendicular to the axis of the work. This will, in ordinary cases and in ordinary shops, be done by hand. If an accurate, smooth thread is desired, the cuts may advantageously be made small. That is, operate the feed by short steps. Here is where good judgment and care count. The final cut or two may well be made quite light.

Fourteen Rules for Figuring Costs and Profits

The National Association of Credit Men, one of the largest and soundest businessmen's organizations in existence, having, it is said, 20,000 members, recommends the following rules for merchants for figuring costs and profits:

1. Charge interest on the net

American Threads

U. S. Standard			60-Degree Sharp V		
Diameter (outside)	No. of Threads per Inch	Root Diameter	Diameter (outside)	No. of Threads per Inch	Root Diameter
1/16	64	0.0422	1/16	72	0.0384
3/32	50	0.0678	3/32	56	0.0628
1/8	40	0.0925	1/8	40	0.0817
5/32	36	0.1202	5/32	32	0.1021
3/16	32	0.1469	3/16	24	0.1153
7/32	28	0.1724	7/32	24	0.1465
1/4	20	0.1850	1/4	20	0.1634
5/16	18	0.2403	5/16	18	0.2163
3/8	16	0.2938	3/8	16	0.2667
7/16	14	0.3447	7/16	14	0.3138
1/2	13	0.4001	1/2	12	0.3557
9/16	12	0.4542	9/16	12	0.4182
5/8	11	0.5059	5/8	11	0.4675
11/16	11	0.5694	11/16	11	0.5300
3/4	10	0.6201	3/4	10	0.5768
13/16	10	0.6826	13/16	10	0.6393
7/8	9	0.7307	7/8	9	0.6825
15/16	9	0.7932	15/16	9	0.7450
1	8	0.8376	1	8	0.7835

European Threads

French System (S.F.)			International System (S.I.)		
Diameter (outside) Millimeters	Pitch Millimeters	Root Diameter Millimeters	Diameter (outside) Millimeters	Pitch Millimeters	Root Diameter Millimeters
3	0.5	2.35	..	...	
4	0.75	3.03	..	...	
5	0.75	4.03	..	...	
6	1.0	4.70	6	1.0	4.70
7	1.0	5.70	7	1.0	5.70
8	1.0	6.70	8	1.25	6.38
9	1.0	7.70	9	1.25	7.38
10	1.5	8.05	10	1.5	8.05
..	...		11	1.5	9.05
12	1.5	10.05	12	1.75	9.73
14	2.0	11.40	14	2.0	11.40
16	2.0	13.40	16	2.0	13.40
18	2.5	14.75	18	2.5	14.75
20	2.5	16.75	20	2.5	16.75
22	2.5	18.75	22	2.5	18.75
24	3.0	20.10	24	3.0	20.10

American Society Mechanical Engineers' Standard

Diameter (outside)	No. of Threads per Inch	Root Diameter
0.060	80	0.0438
0.073	72	0.0550
0.086	64	0.0657
0.099	56	0.0758
0.112	48	0.0849
0.125	44	0.0955
0.138	40	0.1055
0.151	36	0.1149
0.164	36	0.1279
0.177	32	0.1364
0.190	30	0.1467
0.216	28	0.1696
0.242	24	0.1879
0.268	22	0.2090
0.294	20	0.2290
0.320	20	0.2550
0.346	18	0.2738
0.372	16	0.2908
0.398	16	0.3168
0.424	14	0.3312
0.450	14	0.3572

TABLES OF THE VARIOUS THREAD STANDARDS



amount of your total investment at the beginning of your business year, exclusive of real estate.

2. Charge rental on real estate or buildings owned by you and used in your business at a rate equal to that which you would receive if renting or leasing it to others.

3. (*See note below). Charge in addition to what you pay for hired help an amount equal to what your services would be worth to others; also treat in like manner the services of any member of your family employed in the business not on the regular pay roll.

4. Charge depreciation on all goods carried over on which you may have to make a less price because of change in style, damage, or any other cause.

5. Charge depreciation on buildings, tools fixtures, or anything else suffering from age or wear and tear.

6. Charge amounts donated or subscriptions paid.

7. Charge all fixed expenses such as taxes, insurance, water, lights, fuel, etc.

8. Charge all incidental expenses, such as drayage, postage, office supplies, livery expenses of horses and wagons, telegrams and telephones, advertising, etc.

9. Charge losses of every character, including goods stolen or sent out and not charged, allowance made customers, bad debts, etc.

10. Charge collection expenses.

11. Charge any other expense not enumerated above.

12. When you have ascertained what the sum of all the foregoing items amount to, prove it by your books, and you will have your total expense for the year; divide this figure by the total of your sales, and it will show you the per cent which it has cost you to do business.

13. Take this per cent and deduct it from the price of any article you have sold, then subtract from the remainder what it cost you (invoice price and freight), and the result will show your net profit or loss on the article.

14. Go over the selling prices of the various articles you handle and see where you stand as to profits, then get busy in putting your selling figures on a profitable basis and

talk it over with your neighboring business men and competitor as well.

Burns in the shop are not infrequent and it is therefore well to know of and have on hand a good first aid. Perhaps there is nothing as simple and as good in the hands of the unprofessional person as lime water and linseed oil. Equal parts of each should be kept in a handy bottle, the bottle being well shaken, of course, before applying any of the liquid as the two ingredients do not mix readily.

Another first aid for the careful smith is a small bottle of iodine. This is especially good for use on wounds and cuts. Its prompt application by means of a small wad of cotton may many times prevent serious consequences from poisoning through an open wound or cut.

The country and nation depend upon agriculture and agriculture depends upon the smith to a great extent. The forge and farm go hand in hand. Hammer and anvil, plow and reaper, are the implements of industry in the common cause, the building and developing of the country and nation. Watch the farmer and the agricultural development of the country and be guided accordingly. The farmer is using a greater number of labor-saving and time-saving implements every season. He is buying and using automobiles, tractors and power machines to a greater extent every year. To keep step with progress, to take advantage of his opportunities and to keep the craft abreast of modern advancement, the smith must answer the call of progress and do the work that progress and opportunity are pointing out.



Veterinary Notes for the Horseshoer

Conducted by DR. POWELL of Considine and Powell—Cleveland, Ohio.

Corns

A corn is the result of an injury to the sensitive sole between the wall and the bar involving the soft tissues underneath. The bruise causes a rupture of the capillary blood vessels and a small amount of blood escapes, staining the horn a dark color.

Corns are most often found on

the front feet as these bear most of the body weight when traveling. The inner part of the heel is more often affected than the outer.

There are three kinds of corns, namely: Dry, Moist and Suppurative.

A dry corn is one in which the injury has been unattended with excessive inflammatory changes.

A moist corn is one in which a great amount of inflammatory exudate is present—the corn appearing moist.

A suppurative corn is one in which the inflammatory exudate is complicated with pus.

Causes—All feet are exposed to corns, although the heavy draft horse when used at fast work on city pavement or hard roads are most liable to the trouble. Mules are very rarely affected.

Predisposing Causes

There are a number of predisposing causes of which the following are the most common: high heels; contracted heels, which, to a great extent, destroy the elasticity of the foot; and feet in which the horn of the wall is too thin, allowing it to spread so the sole strikes the ground. The wide flat foot with low heels, accompanied by flat soles whose posterior wings rest on the ground or shoe, also in this form of hoof the arch of the sole is so broad, the weight of the body causes the sole to strike the ground and subjects it to bruises, causing corns.

Direct Causes

Improper shoeing is conceded by the best authorities to be the most common causes of corns.

One of the most common errors is found in preparing the foot to receive the shoe. The sole is freely pared away as is also the frog—nature's main support to the branches of the sole, weakening the arch and allowing the sole to strike the web of the shoe or the ground. The heels are also largely cut away, allowing the sole to strike the ground on the slightest uneven surface.

This wrong preparation of the foot not only permits of the downward movement of the sole but also removes the one great means by which the foot is relieved of concussion.

Another error is the construction and fitting or non-fitting of the shoe to the foot.

Shoes with too high heel or toe calks remove the pressure of the frog on the ground tending to cause a contraction of the heels, resulting

*(Rule 3 does not apply in the case of smithing or other similar labor or job work as the labor item depends upon the job and must be added as time work. A proprietor's salary must, however, be added, as he is entitled to some compensation as manager. If he works on a job his time so spent must be added the same as any workman or helper).



in pinching and bruising of the sensitive sole. A shoe set so as to press upon the sole or one that has been on so long that the hoof has overgrown it, until the sole and bar rest on the heel of the shoe tend to cause corns by an irritation or an injury to the sensitive sole.

Small hard objects, such as stones, pieces of iron, etc., when getting in between the shoe and wall, cause an injury and thereby corns.

Shoes extending too far back on the heels, thin heels which permit the shoes to spring, short heels with calk set under foot, excessive concavities of the shoe, and shoes too light for the kind of work the animal is doing are all common causes of corns.

Symptoms

Unless the simple corn is accidentally discovered by the discoloration of the horn it may go unnoticed and animal shows no sign of its existence.

Ordinarily the first symptom of a corn noticed is that of pain, which may be slight as in cases of dry corns and a decided lameness as in suppurative corns. There is not a characteristic lameness shown and a positive diagnosis can only be made by the finding of the discoloration of the sole in the angle between the bars and wall.

An animal with a corn that is painful is generally restless, pawing their bedding behind them at night and refusing to lie down for any considerable length of time. The foot affected is usually advanced, relieving it as much as possible of all weight and the fetlock is flexed to remove the pressure from the heels.

In recent and severe cases the heel on the side affected is hot and in some cases the whole foot is hot and tender to pressure.

If a corn is suspected an examination should be made on the inside of the heel. The animal will flinch when the affected part is tapped with a hammer or when the wall and bar is grasped between the jaws of pinchers with moderate pressure.

To make a positive diagnosis pare the sole in the angle and the discoloration is seen, especially in the dry corn. The discoloration may be lacking in moist, or suppurative corns but in these cases the horn is moist, soft, often white and stringy.

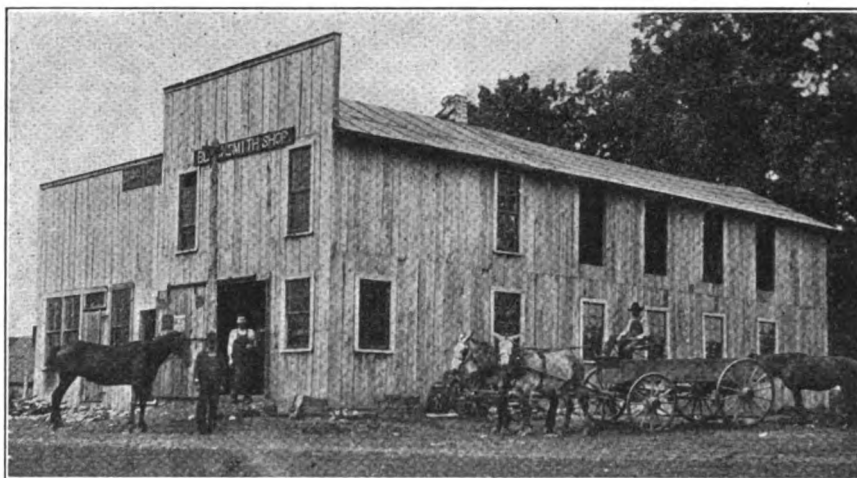
A moist corn is caused by long continued and more severe injury than a dry corn and this inflammation set up by the injury causes a

citron-colored fluid which undermines and permeates the sole, causing it to become soft and spongy.

The changes taking place in the suppurative corns are the same as those in the moist corn, only carried further and complicated with the addition of pus. The pus forms in the horny box of the foot, increasing in quantity until it gradually works up the inside of the hoof until it breaks out at the coronet. The animal is severely lame while this process is going on and until it breaks open when the lameness usually disappears until the opening is closed up by nature and the pus again forms. The pus from the suppurative corn very frequently extends to the lateral cartilage, infecting it and caus-

In chronic dry corns when a slight lameness is present the foot should be poulticed for two days and the discolored horn pared away. Remove all pressure at the heel on the side that is affected and if the animal must be worked shoe with a bar shoe or one having stiff heels.

If inflammation is present in moist corns, cold baths and poultices should be used; when the fever subsides and the horn is soft, cut away the diseased horn, cauterize lightly and poultice the foot for two or three days. A plug of cotton saturated with Tincture of Iodine should be placed where the hoof has been cut away. Apply a roller bandage to keep wound clean and dress every day until lameness subsides or a healthy layer of new horn covers the



THE NEW SHOP OF MR. W. S. JONES, OF MISSOURI

ing what is known as "Quittor".

Treatment: The most common producers of corns are the shoeing and the paring of the foot, so this will have to be looked to, to remove the causes of this condition.

The correct shoeing for nearly all feet is the one with the flat bearing surface or one moderately seated but flat at the heels. For the flat foot the shoe will have to be concaved on the upper surface so that it will not bear on the sole.

For the heels that are low the shoes must be made thin at the heels. For the very broad foot with a light wall toward the heels a bar shoe with pressure on the frog is the proper shoe to use.

A piece of leather placed between the shoe and the foot serves nicely to relieve concussion.

The hoof should be kept in a normal condition at all times and it is sometimes necessary to use moist packs, hoof ointments, etc., to do this.

wound. Shoe the foot the same as for dry corns.

In suppurative corns the loosened and affected horn must be removed and drainage given so pus can escape. If there is a discharge of pus at the coronet an opening must be made at the sole. Syringe this track out with bichloride of mercury in a solution of 1 to 1,000 each time previous to using the following, as an injection twice daily for the first three days, once daily for the next two days and once every other day until the discharge stops:

Subacetate of lead, liquid.... 4 oz.
Sulphate of zinc 2 oz.
Sulphate of copper..... 2 oz.
Acetic acid 1 pt.

Dissolve the salts in the acid, add little by little the subacetate of lead, and shake the mixture well.

A roller bandage should be applied to keep the wound and foot clean. Shoe the foot the same as for dry corns.



What Does it Matter?

NOAH BARKER.

(In Drill Clips.)

It matters little where I was born,
Or if my parents were rich or poor;
Whether they shrunk at the cold world's
scorn,
Or walked in the pride of wealth secure.
But whether I live an honest man
And hold my integrity firm in my clutch
I tell you, brother, as plain as I can,
It matters much.

It matters little how long I stay
In a world of sorrow, sin, and care;
Whether in youth I am called away
Or live till my bones and pate are bare.
But whether I do the best I can
To soften the weight of Adversity's
touch
On the faded cheek of my fellow man,
It matters much.



Heats, Sparks, Welds

"Liquid Cheer", contrary as it may seem, is not the thing to make shop workers really cheerful.

How much the man behind the gun must really depend upon the man behind the anvil and the man behind the machine and the man behind in the factory, shop and hospital!

The work a horse can stand may be increased or decreased by treatment, feeding and shoeing.

Modern machines take much of the drudgery out of work these days. Look through the pages of this issue and find out just how easy smith shop work can really be.

Men may write mottoes, slogans and poems to entirely cover the walls of the work shops of the times, but how much closer to solving the problem of success, comes the sound, practical journal which tells the worker the how the why and the wherefore.

Have you missed any chance for profit in this issue? Better go through the paper again to make sure. There are many chances for profit in this number. Don't miss one.

It's the man who mixes brains with his work that gets the extras. The man who works like a horse gets a horse's wages—three meals and a bed. Work alone never

nets the little extras that make life and work worth while.

How's the garden getting on? What! no time for a garden? Then take time. If it is only a small one get away from the hoofs and hard metal occasionally and get close to God's great outdoors. Let some of nature's green things teach you their story. You'll feel better, be better and your work will show better for an occasional trip back to nature and away from the anvil and forge.

The successful smith of today must be a thorough business man as well as a good mechanic. It's one thing to build a machine, but quite another matter to sell it. The successful smith must know how to do his work right, how to get customers, how to treat them and how to do business in a business way.

The drug store of years ago consisted of a large bottle of colored liquid in each window and a stock of drugs and castor oil. Today the modern drug store makes fifty-seven different efforts to grab a piece of your change before you get out. Its stock ranges all the way from cigars, candies and soda water to magazines, kodaks and toys. Wouldn't a little of the same business expansion often place the unprofitable smith shop in the successful class? There's no reason why the general shop cannot expand, branch out and take in profitable lines that are suited to smith shop connection.

The happy cheerful smith keeps a shop into which customers just enjoy coming.

A postal card will be all you need to tell us that you want another herd of pink Buffaloes. Tell us to head a herd your way, and they will come by return mail. Of course, you are using them freely on your letters to manufacturers, jobbers and brother smiths.

When a smith says he is sorry he ever learned blacksmithing, is the trouble with the man or with the trade?

Properly cared for equipment pays big dividends. Lack of care wears out more tools than actual use.

Many a failure in business is the result of someone's failure to look after collections properly. Keep on the heels of your debtors so that you can keep business going right.

You are not likely to know all about a machine the minute it comes into the shop, but you are expected to study the manufacturers instructions carefully, to apply them studiously to the machine you have and then if you have difficulty or trouble, ask the manufacturers and they will be glad to help you on those things which you do not understand.

More profits cannot be made by cutting anything except expenses or costs. Cut prices never produced satisfactory profits. If you feel that your end of the selling price is too big, that you are imposing upon your good customers, that you are making too much money, then cut your prices to where you think they should be; but if you consider the present cost of stock and supplies high enough and your profit too small, cut down expenses, boost your prices and get the reward that you should really have for your labor.

"Advertising?" queried Tom Tardy, "there ain't no occasion for me to spend money for advertising. Everybody hereabouts knows me, knows my shop and where they can find me", and strange as

it may seem, we are compelled to agree with our friend, Tom Tardy.

The folks who never heard of you or your shop cannot trade with you so how can you expect new business from time to time unless you advertise. Your shop sign is read only by those who pass by. The people who use the other street or road will not know about your shop. Advertising is the solution. Bring your business to the attention of those who do not know you, through the agency of the printed page, card or circular.

Did you read an article in this issue describing a multiple calk shoe? If you have not read it, turn to Doctor McDonough's article right now, read what he has to say on the subject, and then let us know what you think about this shoe.

It is poor business to feed the profit of one department or branch of your business to keep another fat and healthy. Careful accounting in each and every department will prevent this and tell you just where you stand at all times. It will show you what departments are producing a profit and which ones are producing a loss. It will show you the departments that are worth pushing to success and which are worth pushing out the back door.

Lots easier these days is the smith's lot. Just look through this issue of "Our Journal" and see the many labor saving machines that the modern smith can install in his shop. We hear considerable talk occasionally about the "good old days", but the modern smith with a modern equipment of up-to-date machines will look upon the old days as very poor ones, indeed.

It is well to use caution, of course, but too much caution sometimes stands in the way of advancement. Some folks—Tom Tardy, for example, are so afraid of new things that they go through life in a rut. There is no harm in trying new things, but it is well to mix plenty of good common horse sense with the trying.

Taking a vacation voluntarily will sometimes postpone the forcible taking of a vacation. And when taking your rest, see that it is a real rest. Don't bustle, bluster and blow at some resort or fancy park. Take the Missus and children to some cool, quiet place and rest. Take things easy for a while by helping the family to enjoy themselves. And if you think twice before you start, it won't cost you very much.

Are you getting dividends on your spare time? Time is money, but spare time is money invested at fifty per cent. and paying a daily dividend. Are you investing your spare time properly?

Don't be afraid to do your work differently if you can do it better. Simply because a job has been done a certain way for ten, twenty or thirty years is no reason to suppose that it is being done correctly. The chap who did it the first few times may have been a "botch."

We don't expect you to agree with everything that is said in "Our Journal", but what is said should make you think and think sufficiently hard to write in and tell your side of the story.

The best is always cheapest in the end. Cheap machines are expensive at any price. When you buy, buy good tools made by reliable makers. Better have a few tools of first quality than a shop full of third-rate junk.



Our Honor Roll

AND STILL THEY COME

More and more readers are taking advantage of "Our Honor Roll" every month and it is becoming more difficult each month to find a place on the list of Honor Subscribers. If you do not know what a saving you can make by taking advantage of Our Long-Time Rates look over the table of rates and see just how can save money and at the same time insure your subscription account. Sharpen your pencil and get down to actual figures and then get your name on this list of Readers who are paid up well in advance.

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The Horseshoer

Anatomy of the Horse's Foot and the Science of Horseshoeing

PROF. HENRY ASMUS.

Vicious Horses Must Often be Severely Handled

Watch the play of the ears and eyes continually, and immediately punish every exhibition of temper either by jerking the halter or bridle vigorously, or by loud commands. If this does not avail, then if soft ground is at hand make the horse back as rapidly as possible for some time over this soft surface; it is very disagreeable and tiresome to him.

To raise a hind foot we may knot a strong, broad, soft plaited band (sideline) into the tail, loop it about the fetlock of the hind foot, and hold the end. This often renders valuable service. The holder seizes the band close to the fetlock, draws the foot forward under the body, and then holds it as above described. The use of such a band compels the horse to carry a part of his own weight, and at the same time hinders him from this rope or band about the fetlock, kicking. Before attempting to place the front foot on the same side should be raised.

The various sort of twitches are objectionable and their use should not be allowed unless some painful hoof operation is to be done.

We do not immediately cast or place in the stock those horses which resist our attempts to shoe them, but first have a quiet, trustworthy man hold them by the bridle-reins and attempt by gentle words and soft caresses to win their attention and confidence.

Ticklish horses must be taken hold of boldly, for light touches of the hand are to such animals much more unpleasant than energetic, rough handling. Many ticklish horses allow

their feet to be raised when grasped suddenly without any preparatory movements.

Preparing the Hoof for the Shoe

This preparation is usually termed paring, trimming, or dressing. It is a most important step in the process of shoeing, and its object is to shorten the hoof, which has grown too long under the projection of the shoe, and prepare it to receive the new shoe. The instruments needed for this work are the rasp and the hoof-knife. Upon large hoofs a pair of sharp nippers or a sharp hewing knife, with broad handle and perfectly flat, smooth sides, may be used, since these instruments will considerably facilitate and hasten the work. After the shoer has carefully examined the hoofs and has fixed in mind the relation of the height of the hoofs to size and weight of the body he cleanses the hoof and removes all stubs of old nails; at the same time he should be asking himself if, where and how much horn is to be removed. In all cases all loosely attached fragments of horn are to be removed, for example, chips of horn produced by repeated bending and stretching of the lower border of the wall. The sole is then freed from all flakes of dead horn. The shoer then runs the rasp around the outer border of the wall and breaks it off to the depth to which he thinks it should be shortened, and then cuts the wall down to its union with the sole, so that at least one-eighth of an inch of the edge of the sole lies in the same level as the bearing-surface of the wall. Finally, the wall, white line, and outer margin of the sole, forming the Bearing-surface, must be rasped until they are perfectly horizontal.

In dressing the hoof the branches of the frog should always be left prominent enough to project beyond the bearing-surface of the quarters about the thickness of an ordinary flat shoe. If it be weakened by paring, it is deprived of its activity, shrinks and the hoof becomes narrow to a corresponding degree. The frog should, therefore, be trimmed only when it is really too prominent, however, loose and diseased particles of horn may be trimmed away when it is affected with thrush.

The bars should be spared and never shortened except when too long. Their union with the wall at the quarters must in no case be weakened, and never cut through ("opening up the heels"). They should be left as high as the wall at the quarters, or only a little less,

while the branches of the sole should lie about one-eighth of an inch lower.

The buttress (the angle formed by the union of the wall and bar) requires special attention. In healthy unshod hoofs the bars run backwards and outward in a straight line from the anterior third of the frog. In shod hoofs, however, it happens that the buttresses gradually lengthen, curl inward, and press upon the branches of the frog, causing the latter to shrink. In such cases the indication is to remove these prolongations of horn from the buttresses so as to restore to the bars their normal direction.

Physiological Movements of the Hoof

These movements comprise all those changes of position within and of the hoof which are brought about by alternately weighting and relieving the foot, and which are manifest as changes of form of the hoof. The following changes in form of the hoof are most marked at the time that the hoof bears greatest weight, that is, simultaneous with the greatest descent of the fetlock-joint.

1.—A lateral expansion over the entire region of the quarters occurring simultaneously at the coronary and plantar borders. This expansion is small, and in general varies between one-fiftieth and one-twelfth of an inch.

2.—A narrowing of the anterior half of the hoof measured at the coronary border.

3.—A decrease in height of the hoof, with a slight sinking of the heels.

4.—A flattening (sinking) of the sole, especially in its branches. These changes of form are much more pronounced in the half of the hoof that bears the greater weight.

A hoof while supporting the body-weight has a different form, and the tissues enclosed within it a different position, than when not bearing weight. Since loading and unloading of the foot are continually alternating, the relation of internal pressure even in the standing animal are continuously changing, so that, strictly speaking, the hoof is never at rest.

The changes in form take place in the following order: The body weight falls from above upon the os coronae, os pedis, and navicular bone, and at the moment that the foot is placed upon the ground is transmitted through the sensitive laminae and horny laminae to the wall. At the instant that the fetlock reaches its lowest point the os pedis bears the greatest weight. Under the



bodyweight the latter yields, and with the navicular bone sinks downward and backward. At the same time the upper posterior portion of the os coronae passes backward and downward between the lateral cartilages which project above the border of the wall, and presses the perforans tendon down upon the plantar cushion. The plantar cushion being compressed from above, and being unable to expand downward, is correspondingly squeezed out towards the sides and crowded against the lateral cartilages, and they yielding, press against and push before them the wall at the quarters. The resistance of the earth acts upon the plantar surface of the hoof, and especially upon the frog and it widening, crowds the bars apart, and in this manner contributes to the expansion of the quarters, especially at their plantar border. The horny sole under the descent and pressure of the os pedis sinks a little, that is, the arch of the sole becomes somewhat flattened. All these changes are much more marked upon sound unshod hoofs, because in them the resistance of the earth upon the sole and frog is pronounced and complete. These changes in form are more marked in front feet than in hind.

In defective and diseased hoofs it may happen that at the moment of greatest weight-bearing, instead of an expansion a contraction may occur at the plantar border of the quarters.

Three highly elastic organs there are which play the chief part in these movements—namely, the lateral cartilages, the plantar cushion and the horny frog. Besides these structures indeed, all the remaining parts of the horn capsule, especially its coronary border, possess more or less elasticity, and contribute to the above-mentioned changes of form.

In order to maintain the elastic tissues of the foot in their proper activity, regular and abundant exercise, with protection against drying out of the hoof, and shoeing decrease or alter the physiological movements of the foot, and these lead under certain conditions to foot diseases with which the majority of horse-owners are entirely unacquainted.

As an outward, visible indication of the mobility of the quarters upon the shoe we may point to the conspicuous, brightly polished and often sunken spots, or grooves, upon the ends of the branches. They are produced partly by an in-and-out motion of the walls at the quarters, and partly by a forward and backward gliding of the quarters upon the shoe.

The benefits of these physiological movements within the hoof are manifold:

1.—Through them shock is dispersed and the body protected from the evil consequences of concussion or shock.

2.—These movements increase the elasticity of the entire limb and in this way contribute much to a light and elegant gait.

3.—They maintain a lively circulation of blood in the vessels of the pododerm, and this insures a rapid growth of horn.

Since it is a generally accepted fact that shoeing interferes with the physiological movements of the hoof, alters them, indeed, almost suppresses them and that all these movements are spontaneous and natural only in sound, unshod hoofs, we are justified in regarding shoeing as a necessary evil.

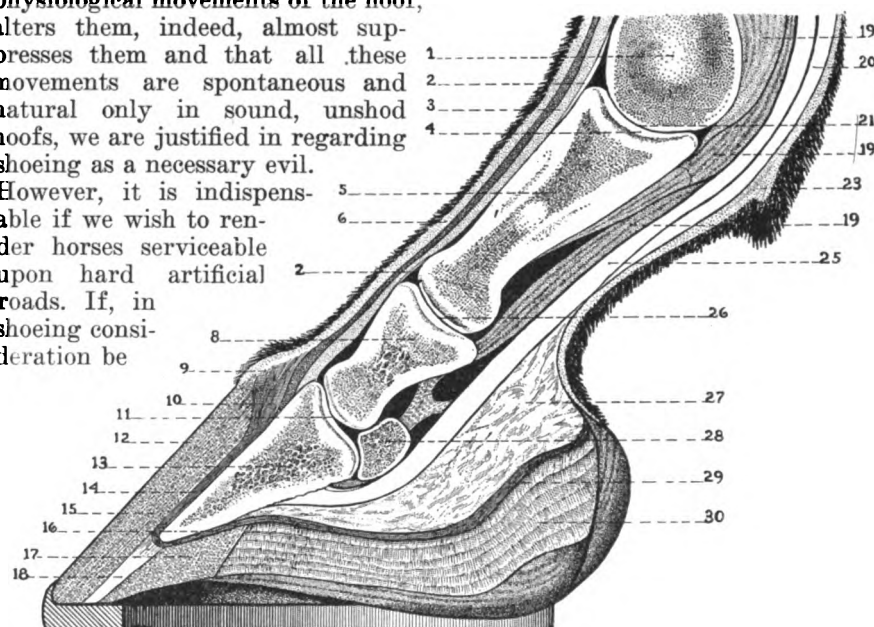
However, it is indispensable if we wish to render horses serviceable upon hard artificial roads. If, in shoeing consideration be

fear of subsequent disease of the hoofs, provided the horse is driven with reason and receives proper care.

The Horse and Its Color

PROF. C. H. MESLER.

One of the most interesting processes in the laboratory of animal creation is to be found in the skin. It covers the whole outside of the animal and binds together the parts. In some places it clings so closely that it hardly admits of any movement—for example, about the bones of the knees, and the forehead and on the back. In other places as on the fore side and flanks, it hangs in loosened folds. In the place where action is needed the skin is folded into various duplicates and can be extended or drawn up as necessary, by means of certain fibrous bundles attached to the true skin. Thus the animal can shake off insects and even the harness. Between these fibrous bundles are extra space which enclose cells, vessels, nerves,



A SECTIONAL VIEW OF THE HORSE'S FOOT

- | | | |
|--------------------------|------------------------------------|-----------------------------------|
| 1—Cannon bone. | 12—Periople. | 21—Fetlock joint. |
| 2—Capsular ligament. | 13—Os pedis. | 22—Ergot. |
| 3—Extensor pedis tendon. | 14—Sensitive laminae. | 23—Flexor pedis perforans tendon. |
| 4—Articular cartilage. | 15—Horny wall. | 24—Pastern joint. |
| 5—Os suffraginis. | 16—Sensitive sole. | 25—Plantar cushion. |
| 6—Skin. | 17—Horny sole. | 26—Os navicularis. |
| 7—Os Coronae. | 18—White line. | 27—Sensitive frog. |
| 8—Periopic ring. | 19—Sesamoidian ligaments. | 28—Horny frog. |
| 9—Coronary band. | 20—Flexor pedis perforatus tendon. | |
| 10—Coffin joint. | | |

given to the structure and functions of the hoof, and particularly to the hoof-surface of the shoe, the ends of the branches being provided with a smooth, level bearing-surface, which allows free play to the elastic horn capsule, in so far as this is not hindered by nails we need have no

gland ducts, hair and in the deep layers, fat. The value of the skin to the horse and the owner may be guessed from the fact that any great disorder of the large surface may bring on disease and death. For instance, if one should coat the surface of the skin with glue, death



would soon follow, for the breathing pores would be stopped up. This lets us into the secret of many troubles where the grooms do not keep the pores of the skin clear of dirt and sweat or dandruff. If the horse owner finds disorders of the stomach that are not quickly cured, he may look for skin eruptions and closing of skin pores.

The skin consists of three layers, a cuticle also called epidermis or scarf skin. Then a thin soft substance through which the pores of the true skin pass. This second skin is called Rete Mucosum. Last comes the true skin, or Dermis. It is in the second skin that we find the cells which contain the pigment granules that give color to the hair and body of the horse. In horses with white hair, the Rete Mucosum is white, in black horses, it is black. The color of the hair determines the color of the horse. The true skin is always of a pale-white and has no connection, whatever, with the color of the hair.

A Collection of Special Shoes for Special Purpose

PART I.

PROF. C. H. MESLER.

The accompanying engraving shows a case of shoes made by Prof. C. H. Mesler. The descriptions following refer to the shoes as numbered:

1.—Front Toe Weight Shoe: For Carriage Horse to increased action to perfect balance.

2.—Front Shoe: To be used on feet with soft ulcerated corns. Take pressure off corns and puts it on frog.

3.—Hind Shoe: With outside heel to balance up foot on horse that wheel out, and keep limp in line.

4.—Front Shoe: For draft horse that stumble when toe and cork is used, toe of shoe rolled motion.

5.—Hind Light Shoe: For driving horse with low outside quarter.

6.—Front Shoe with Half Bar: To assist in building up weak outside quarters when toe and calks are used on paved streets.

7.—Hind Shoe: Light with outside heel calks welded on to stay.

8.—Front Shoe: For draft horse with corns on inside quarter, when toe and calks are required.

9.—Front Shoe: Rolling motion for buggy horse when quick action is required.

10.—Hind Shoes to be used on horse that is defective in his movements of hind parts. This shoe possesses the virtue first of studying the action of hindleg, second to quicken the action, third to prevent interfering it is. They are around good shoes.

11.—Front Shoe for horse that has a sprained ankle. The piece welded on the face of the shoe made round acts for pastern joints.

12.—Hind Shoe for toe dragging caused

by weakness of Extensor tendon, located in the front portion of leg and is not sufficiently guided with power to lift the toe upwards while the horse is in motion. Blister the carnet ankle front portion of leg with the following shoe and rest.

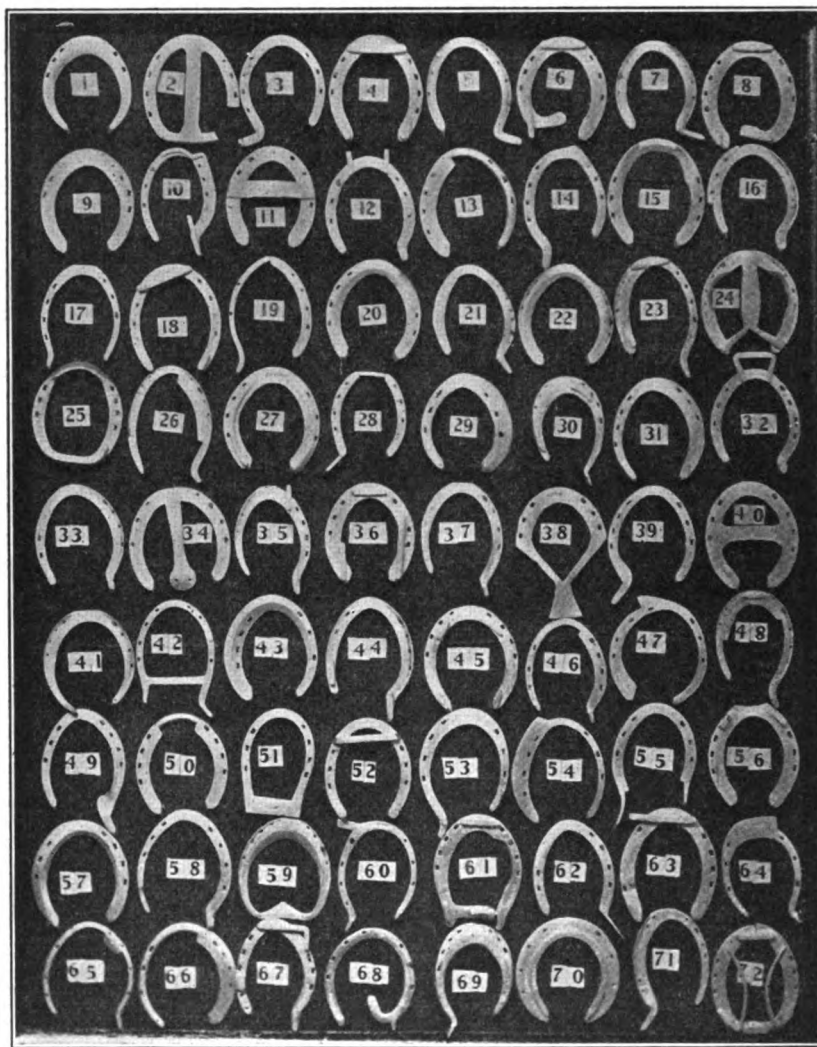
13.—Front Shoe: Side weight with the inside made half round with a swadge for interfering.

14.—Hind Shoes: To be used on horse that wears his toe off on the inside. The point on the inside stand the foot on true

ness on the outside of that on the inside shank, longer on the outside; this shoe will set the foot up straight with a brace to keep it straight in line.

20.—Front Shoe: Convext on outside and roll on inside, toe for road horse that cuts his Carnora Band.

21.—Hind Shoe to be used on horse that is weak and grinds his outside off and leaves inside with a long hoof; weld side calk on outside, set front calk back from toe and in front of first nail on the outside.



A COLLECTION OF SPECIAL SHOES BY PROF. C. H. MESLER

balance. The long shank on the outside keep the pression and lift it at a right angle.

15.—Front Shoe for Forger: To be used on a saddle made with weight in the heel, convext in the toe directly in front of shoe; remove half of the wearing face three inches long from the shoe.

16.—Hind Shoe: For interfering with wing on inside for nail hole stay by impossibility for horse to interfere.

17.—Hind Shoe to be used on a saddler that get up on his front quarters. Weight in the toe will slow his front gait behind.

18.—Front Shoe for interfering, to be used on paved streets for draft purposes where toe and calks are used. The toe setting at this angle widen the action and passes clear.

19.—Hinge Shoe for bad, interfering horse that reels his foot out on the outside trial. This shoe must be the thick-

22.—Front Shoe for Roadster that cuts his knee and throw dirt in buggy. The face of shoe being convext.

23.—Hind Shoe, Side Weight, Ford Calk when the horse is interfering, at the caronet by slow movements of action.

24.—Front Shoe: For sore and badly contracted feet, the shoe made weak at each side and a steel spring on the face that takes the jar from the foot and springs the heel open. Use tar leather and Oakum.

25.—Front Shoe or Bar Shoe with flange across bar and grap toe, to use on a horse in irregular action, that is to say high chopping in front and low and sliding behind. This shoe makes the motion frictionless as the feet leaves the ground and the same time secures safe footing when the feet land.

With this combined toe and grab prevents the extreme folding of the foot and



therefore requires less rotation of the upper pastern joint which makes the foot more fully extended.

26.—Hind Interfering Shoe: Side Weight with roll on the inside to prevent interfering with the side of shoe.

27.—Front Shoe for stoved up and badly sprung in the knees, this shoe keeps up his heels.

28.—Hind Shoe for Forger, used on horse that chop his toe square off in front forge from solid iron with toe $1\frac{1}{4}$ inches high, and outside shank same height.

29.—Front Shoe: Side weight on the outside with rolling motion for buggy horse that wears plain shoes outside low and weak. This shoe will give him a true balance.

30.—Hind Shoe: Toe weight, rolling motion, heel and toe combined, good to use on curb horse to assist him in his travel; makes his toe short and comfortable in action.

31.—Front Shoe: Side weight on the inside with rolling motion and heel calks for buggy horse that interfere and sore tendon.

32.—For Toe Dragging: Used on draft horse when toe and calk are required.

33.—Hind Shoe with heel calks and rolling on inside in front of nail holes for interfering horse at the toe.

34.—Front Shoe used with Leather Pad Tar and Oakum for narrow and contracted heel. This acts as a cushion to the foot.

35.—Hind Shoe for horse that is very low on the outside; set foot straight up and go straight over toe.

36.—Front Shoe for draft horse when toe and calks are required that pull on the outside; give double weakness and keep the foot in line.

37.—Hind Shoe Square Toe, rolling on inside, calk on outside for balance on driving horse.

38.—Front Shoe: Three quarter bar shoe with bars to cover frog between the heels, leaving the diseased portion of the heel without any pressure. This shoe I had designed for the feet of horses suffering from corns in both heels, leaving the sore part entirely free from weight.

39.—Hind Shoe with long shank on outside for driving.

40.—Front Shoe with bar at front of frog for sore in the bottom of foot.

41.—Raised Heel, front shoe, square toe, and to assist in shortening toe of horse that has long toe and low heel.

42.—Light hind shoe for Racers; bar keeps shoe in place and prevents spread.

43.—Front shoe for Road horse that picks up dirt and throws it in buggy; convex on the face side with side weight on the outside by the hoof short, let the shoe extend beyond the hoof to true balance.

44.—Hind shoe, when calks are required and horse interferes with side of foot, roll on inside.

45.—Front Shoe, rolling motion with four calks for stumbling horse, if calks are required for draft work.

46.—Hind Side Weight Calk Shoe: Roll on the inside in front of nail hole for horse that interferes with his toes.

47.—Front Shoe heel weight on outside and toe for a chronic hitter.

48.—Hind Shoe for horse that wears his shoe out in the toe and interferes with his heel.

49.—Hind Shoe to use on horse that is weak on the outside heel and toe.

50.—Front Shoe Swadge in front, round for Forger.

51.—Front Shoe to use on horse that has just commenced to calk out in ankle

52.—Front Shoe for horse that has seedy toe, when toe and calks are required for heavy draft work.

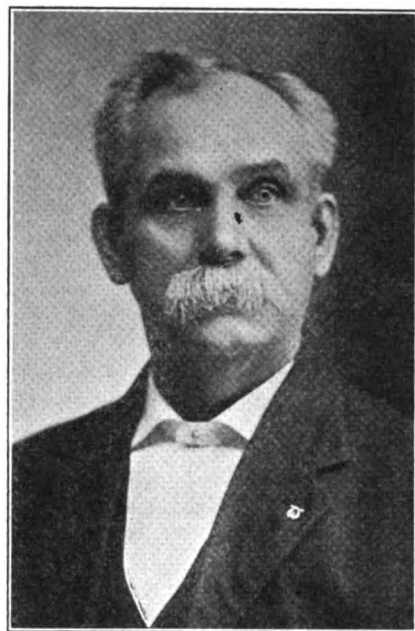
53.—Hind Shoe with toe weight and heel calk to slow up the action behind; good on horse that reels out and forgc; this studies the action behind.

54.—Front Shoe for chronic knee hitter; let the shoe extend out beyond the hoof on outside.

55.—Hind Shoe for Road Work makes a finished job and looks neat when heel is required.

56.—Front Shoe for calks, for chronic stumbler, shorten the toe and remove the obstacle that makes him stumble.

57.—Front Shoe for driving horse that interferes at the ankle; roll on the inside.



MR. A. W. STICKNEY, WHO HAS WORKED FOR 43 YEARS IN ONE SHOP AND IS STILL AT IT IN SPRINGFIELD, VERMONT

58.—Hind Shoe, side weight and heel calks for roadster.

59.—Front Shoe for weight convex and bar combined for frog pressure and quicker action, to prevent throwing dirt.

60.—Hind Shoe, brace at to prevent the horse from breaking over from outside and keep his limb in a straight line with action of body.

61.—Front Shoe with set screw and brace to widen out heel that contracts on one side; can widen out the heel by this set screw.

62.—Hind Shoe; roll on inside to be used.

63.—Front Shoe for draft horse that pull from the outside with toe and heel calks.

64.—Hind Shoe for interfering horse at the toe; the square toe makes the horse swing his limb in the proper balance with body.

65.—Hind Shoe; light raising shoe with thinly side weight.

66.—Front Shoe Side Weight; inside made with half round, swedge out, roll motion to prevent interfering at the ankle.

67.—Hind Shoe to use on a horse that stands one foot on the other, wearing

with the heel of his shoe a hole into the hoof. Put hard leather on the inside heel, fastened with two rivets through holes.

68.—Front Shoe for horse that has corns; half bar with heel calks.

69.—Hind Shoe, toe weight, rolling motion, side heel, outside heel, outside with long shank. Good shoe for forger; the weight in toe slow up action; rolling motion prevent clicking front shoes.

70 Front Novelty Shoe, good for stumbling, forging sore tendon, sore feet, interfering, flat feet.

71.—Hind Novelty Shoe (with rim) used on horse with bad shell and hard to keep shoe on. Let rim extend up on hoof; it will strengthen both hoof and nails.

72.—Front Spring Shoe, hinge in toe and heel for contracted feet.

(To be Continued.)

Give the Horse a Chance

JAMES McDONOUGH, D. V. S.

Editor's Note:—This article by Dr. McDonough is published by him with the following note: "I wish to state that these few remarks are made solely in the interest of the horse; that I have no pecuniary interest in this, or any other form of shoe or pad, and all expense for this and my past work along this line has been met by me."

All columns, placed in a vertical position and supporting weight, are provided with a base or pedestal of sufficient size and of proper shape to insure their stability.

If the equilibrium of the column will be preserved, the base must rest upon a surface with a diameter equal to that of the base. If a horse's hoof—the base of the limb—rests upon a surface as shown in Fig. I, it will give to the limb all the support that it is possible for it to receive from a base of that size and shape. If rested upon three little piers, as shown in Fig. II, it is evident that there is nothing to support the limb at either side. As this is sure to result in injury to the limb, something must be done to correct it, for there is no one who would think of using a horse with his four feet resting in this position.

We will first attempt to correct this condition by attaching to the bottom of the hoof a flat piece of iron (a shoe). If we now rest the shoe upon the piers, as shown in Fig. III, we find that it will rotate with the hoof, as it is a part of it.

We will now attach the shoe to the little piers and we have a three-calked shoe; but we again fail to change the condition as the calks also now become a part of the base and move with it. The relation of the hoof to its supporting surface when it first rested upon the piers has not been changed in the least, as it is now just as easy for the calks to rotate upon the surface below as it was for the hoof to rotate upon the calks. See Fig. IV.

Our very apparent failure to sup-



port the limb by the use of three calks suggests the use of more calks, so we will place one under either side (Fig. V) and the stability of the hoof and comfort of the limb is now assured.

All of our previous efforts to accomplish this seem like kindergarten exercises, as the placing of a support under either side would be the first thought of any six-year-old child of average intelligence. But, as ridiculous as it may appear, the undeniable and indisputable fact re-

any part of the shoe, extending past its point of contact with the ground, to give the slightest support to that part of the hoof resting upon it.

Before making any part of a machine intended to perform a certain work, we will first determine the amount of power necessary for its performance and then make all parts strong enough to stand the strain to which it is possible for a machine of that power to subject them. If the many parts of the machine are properly constructed, and

of the limb where the injury occurs, the part or parts injured must occupy a position corresponding to the direction of the displacement.

I will here refer to a report made by a committee of veterinarians appointed by the New Jersey Veterinary Medical Association to examine the limbs of a number of horses. Upon the limbs of the one hundred and six horses examined, they found 428 permanent injuries—(puffs not included.) Of this number, 412 were situated upon the sides of the limbs. Twelve of the remaining sixteen were on the front of the knee and probably caused by the animals falling or striking the knees against the manger (accident).

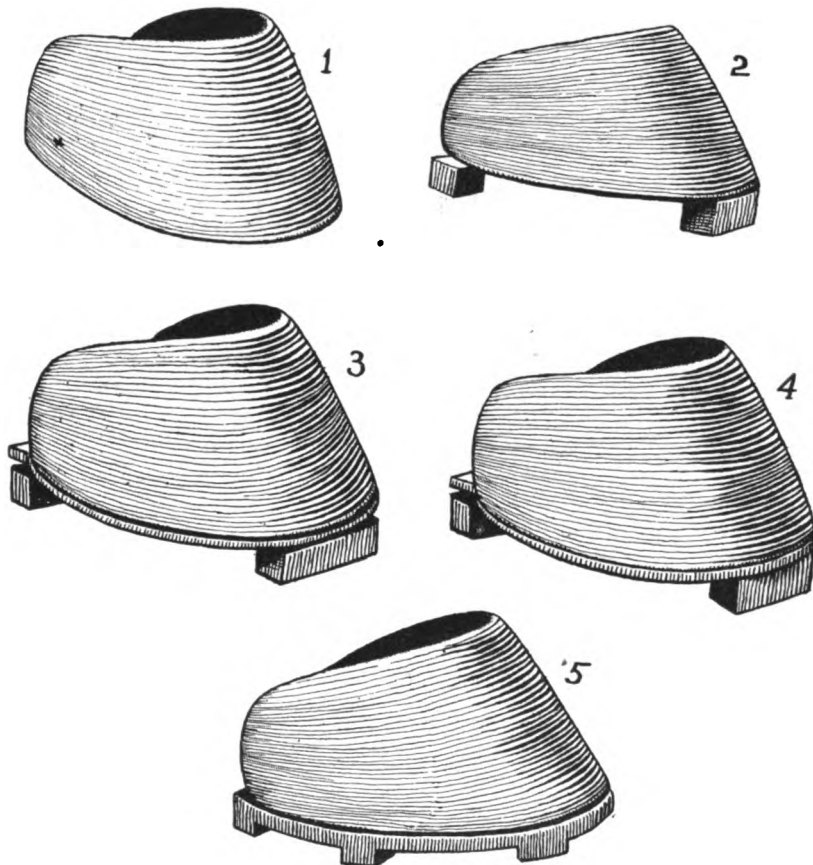
One hundred and fifty-three of the 212 front limbs and 209 of the 212 hind limbs (the propelling levers of the body) were injured to the extent of rendering all of those animals less serviceable, and some unserviceable, at an average age of nine years, which should really be the most serviceable period of the animal's life.

It will be seen by the above report that 412 of the 428 injuries were caused by the displacement of the limbs in the direction of their sides—the result of insufficient support at the place. Had the hoofs been given support at the quarters, there is no reason why the limbs of those animals would not remain sound, and continue serviceable during the life of the animals.

The old-fashioned calked shoes have been universally used for so long a time that it is no easy matter to convince ourselves that they are positively injurious to the limbs of our animals.

But the length of time they have been in use cannot possibly change their principle of support, and unless there is some one prepared to explain in what way it is possible for three-calked shoes to give support to the hoofs at either side, or show how it is possible for the limbs to perform their work, and escape injury, in the absence of support under either side, we should take some action that will cause the discontinuance of this diabolical and brutal practice.

This can best be accomplished by encouraging the manufacturers of horseshoes to place upon the market shoes with calks at the quarters, allowing the shoer to heel and toe them as before. This will remove the one and only obstacle to their use—the difficulty of adding side calks to shoes of the present make.



DR. McDONOUGH MAKES A PLEA FOR FAIR TREATMENT FOR THE HORSE

mains that for hundreds of years horses have been compelled to travel and work with all four feet resting upon three little piers, whose shape, position and relation to the bottom of the hoof are identical with the condition shown in Fig. II.

And we of this Twentieth Century continue to do this in the presence of the most convincing proof of its injurious effects seen upon the limbs of every horse that has performed six months of any kind of service, while shod with three-calked shoes. For some unknown reason we think that that part of the shoe extending past the calks at either side gives support to the hoof at that place, and these simple illustrations are given to make plain that it is impossible for

carefully adjusted, they cannot be injured by the work possible for a machine of that power to subject them. If the work exceeds the power of the machine, it simply stops without injury to itself.

So it is with the horse. While their limbs remain in their normal position it is impossible for them to be injured by any amount of power of which the animal is capable. And for this reason any injury to the limb, barring accidents, can be accepted as proof that the adjustment of the limb has been disturbed, for we cannot question its construction, and the injuries will exist upon that part of the limb where the work has been increased.

As the displacement of the limb must be in the direction of that part



If we will do this, it will add 100% to the value of horses by doubling their present period of usefulness, and relieve them of the sufferings we have so long compelled them to endure in silence.

Will someone give just one reason why shoes having but three calks should ever be used or will anyone offer a single objection to the use of two additional calks?

A New Way to Sharpen Tools

H. WINSLOW FEGLEY.

Alexander Blom, of Reading, Pennsylvania, a machinist, has invented a little device which he uses while not at work in his shop and when power from machinery is unavailable. This device is nothing more than a small emery wheel, so arranged that it can be slipped over the little fly-wheel of any sewing machine. This allows Blom to sharpen his scissors and knives during the evening hours, and has been the means of bringing in a nice little sum of pin money. He has applied for a patent and expects to manufacture them, so that housewives who wish to sharpen their dull scissors, can do so without much exertion.

The wheel is principally made of felt, covered with emery. Blom's



ALEXANDER BLOM AND HIS EMERY WHEEL ATTACHMENT FOR SEWING MACHINES

secret lies in the changing of the bearing of the fly-wheel upon which the device is placed. This changing causes the wheel to revolve at much greater speed than usual. When properly geared any woman can grind a pair of scissors with as much ease as she sews a string to her apron. When the clutch in the wheel is thrown out, it leaves it free from the rest of the sewing machine

and the grinding can be done without increasing the wear of the sewing machine in general.

Springs and Their Repair

H. N. POPE

I find an article on springs which interested me somewhat and I thought it would be a good time to put in a word myself. First, I do not believe in welding a broken spring but I send it to the factory and have it repaired. They have both the tools and they know how. But as this cannot always be done, we have to repair them at the forge. One man will condemn the practice of another while the other man is just as emphatic in abusing the way another smith goes about the job. One will split and weld, another just lap weld in the ordinary way. I find no fault with either man. It is just as one is brought up. My practice is to split and weld. I think it the way. Do not try to draw to length, but if bottom leaf, I unroll the end enough to get proper length. As to tempering, that is something, I do not try to do, as no smith, I care not how good he may be, can get the proper heat in an open fire. Neither can a leaf be drawn evenly. When I have a new leaf to put in after rolling at the eyes, I heat it a very little and fit with hammer. Water hammer it, put it in place and it is seldom one gives trouble. But as I said before, the only way to do it right is to send it where such work is done.

Safety Rules for Hardening Ryolite Tool Steel*

1.—It is well to anneal all tools before hardening to remove machining strains.

2.—If you heat your tool in a forge, turn it often to secure a uniform heat.

3.—Do not let the piece soak, as a piece which has soaked too long is liable to lose carbon.

4.—Do not take hold of a hot piece of steel with cold or wet tongs.

5.—Steel should not be thrown into the bath, but held in it, as laying on the bottom would cause one side to cool faster than the other and consequently it would warp.

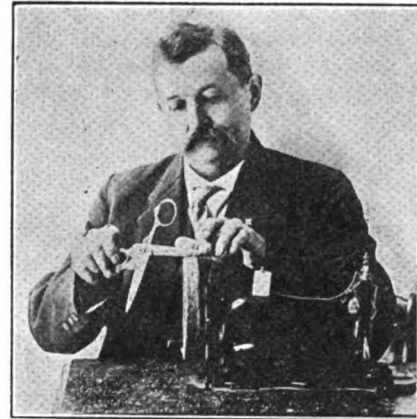
6.—Keep the piece moving, so that no vapor will form around the tool and prevent it from cooling uniformly.

7.—Plunge the piece quickly, so that the bath will cover the largest

possible portion of the tools as quickly as possible.

8.—All hollow pieces should be plugged on both ends to prevent steam forming in the center, which would throw hot water and injure the tool.

9.—Pieces with thin edges and of intricate sections should be im-



SHARPENING A PAIR OF SHEARS ON A SEWING MACHINE

mersed, so that the most bulky portion enters the bath first.

10.—To harden one part of a tool only, be sure to immerse so that it hardens well beneath the heated part.

11.—Pieces which are very intricate should be rigged up with hooks, clamps or supports to prevent warping.

12.—Last, but not least, do not remove the tool from the bath before you are sure it is cooled all the way through.

Always harden carbon tool steel at the lowest possible heat.

Always harden carbon tool steel on the rising heat.

Tempering Colors

Very Pale Yellow	430° Fahr.
Light Yellow	440° Fahr.
Pale Straw Yellow	450° Fahr.
Deep Straw Yellow	470° Fahr.
Straw Yellow	480° Fahr.
Dark Yellow	480° Fahr.
Yellow Brown	490° Fahr.
Brown Yellow	500° Fahr.
Spotted Red Brown	510° Fahr.
Brown Purple	520° Fahr.
Light Purple	530° Fahr.
Full Purple	540° Fahr.
Dark Purple	550° Fahr.
Full Blue	560° Fahr.
Dark Blue	570° Fahr.
Blue Green	630° Fahr.

Different Methods of Annealing

Different methods other than a slow cooling furnace can be used for annealing. The steel, when it has reached its proper heat, should be placed in a box of lime or some other non-carbonizing material. A cast iron box lined with fire clay or brick

*From Ryerson's Monthly Stock List, published by Joseph T. Ryerson & Son, proprietors of Ryolite.



is most preferable, or pipe with both ends closed.

The box can be heated in a furnace and set out on the floor to cool. It is always best to have sufficient time for annealing, although pieces can be removed from the furnace or box when 550 degrees F. has been reached, or a dark purple color, and there will be no danger of air hardening.

If the temperature of the steel does remain below the heat of transformation, its grain does not change; 1,650 to 1,700 degrees F. is a good degree of heat to aim at.

The more common materials can be used for annealing, such as powdered charcoal, charred bone, charred leather, mica, slacked lime, sawdust, sand, fire clay or magnesia.

Drawing Temperatures

450° F.—Pale Straw Yellow

Tools for Metal Planers
Small Turning Tools
Hammer Faces
Steel Engraving Tools
Wood Engraving Tools
Ivory Cutting Tools
Scrapers for Brass
Bone Cutting Tools
Parer Cutting Tools

460° F.—Straw Yellow

Punches Dies
Screw Cutting Dies
Leather Cutting Dies
Wire Drawing Dies
Taps
Milling Cutters
Metal Boring Tool Cutters
Reamers
Tools for Wood Planers
Inserted Saw Teeth
Knife Blades
Wood Cutters
Tools for Cutting Stone
Rock Drills
Half Round Bits
Chasers

500° F.—Brown Yellow

Wood Boring Cutters
Edging Cutters
Hand Plane Cutters
Flat Drills
Twist Drills
Drifts
Wood Gouges

530° F.—Light Purple

Hack Saws
Axes
Wood Bits Augers
Dental Tools
Surgical Instruments
Springs

550° F.—Dark Purple

Cold Chisels for Steel
Chisels for Wood
Circular Saws for Metal
Screw Drivers

570° F.—Dark Blue

Cold Chisels for Iron
Saws for Wood
Molding Cutters to be Filed
Planer Cutters to be Filed



Benton's Recipe Book

For welding files and steel of similar character I. T. says: "Take one pound of pulverized borax, three ounces of black oxide of manganese, half an ounce of carbonate of iron and half an ounce of sal ammoniac and mix well. Use the same as ordinary compound."

When welding steel to iron fork the iron and insert the steel. Iron requires a higher heat than steel and therefore should also be placed in the fire earlier. If the work is very difficult and the very best results are imperative two fires may be used, one of charcoal for the steel and one of coke for the iron.

A gas engine caution that was good advice and frequently mentioned years ago is just as good today for both gas engine and automobile operators to follow. It is: In starting the gas engine, if it fails to respond after three or four trials, don't keep turning the crank until you are exhausted. There must be a reason for its not starting—find out why and remedy the trouble first.



Queries— Answers— Notes.

Time to Quit Thinks This Smith.—I have worked at the trade for forty years and never before have I been disgusted with horseshoeing. When a farmer can go to a hardware store and buy shoes and calks for less money than I can, as they do here, and then shoe their own horses and expect me to keep a warm shop for them to come and sit around and swap lies, and then kick because I don't open up by seven o'clock and have the shop red hot, I think it time to quit.

If there is no way to stop dealers from selling shoes and calks to horse owners, in a few years there won't be a blacksmith in business. The young men won't learn the trade for that reason.

A. T. NIVER, New York.

A Plow-Share Holder.—In last month's

issue of our paper one of our brothers was asking for some tool to hold plow-shares with. Now, I believe there is one he will like if tried, and it will also save him from buying one. Take a half-inch square bar and bend and weld according to diagram. If you want to, you can make the bottom frame with half-inch square rod and the top with round rod. I have used them both ways, but prefer the square.

The slot at A should be wide enough to permit a 3/4-inch bolt to slide along easily. This side of the holder is bolted to the plow-share with two bolts. The other dimensions are shown in the engraving.

I hope this may help some brother and that THE AMERICAN BLACKSMITH keeps growing and coming to my shop.

OLLIE WHITEHOUSE, Illinois.

A Few Raps.—Just a shot at some of these would-be horseshoers who delight in taking a rap at the bar shoe for contraction. In the first place, the trouble with most of these guys is that they can't make a bar shoe that looks like anything. Some of those I have seen you could not tell if they were singletrees for bake overs or self-starters for Fords. I have been shoeing horses now the last twenty years and in all this time I have never seen a case of contraction that could not be relieved with the bar shoe.

Naturally some cases are very stubborn but with a little patience and common sense they will soon show results. One more rap I want to take is at Mr. E. M. S., of North Carolina. It seems to me that he is running a charitable institution, not a blacksmith shop. Any man that has not enough nerve to charge any more for his work than he does, ought to get a job as a section Jerry and ask the Almighty to forgive him. G. L. HUGHES, Colorado.

Brazing Grabs on Shoes.—Can you send me instructions on brazing grabs on racing plates as I will have some of the work soon. C. R. BOLTON, Illinois.

In Reply.—To braze grabs with copper on light shoes, use two heats. First, have the fire clean and fit the shoe to the foot and partly turn toe-clip. Second, see if grab fits well, then place in vise with gentle pressure and make grab fit close to shoe. Now, place a small piece of copper wire, No. 16 will do, on the shoe with pulverized borax. Place the shoe with wire and grab in proper place on top of the fire so that you can watch the copper and blow the fire gently. As soon as the copper melts, remove the shoe from the fire and place in the vise under gentle pressure. Do not strike with the hammer. The shoe may now be finished and attached.

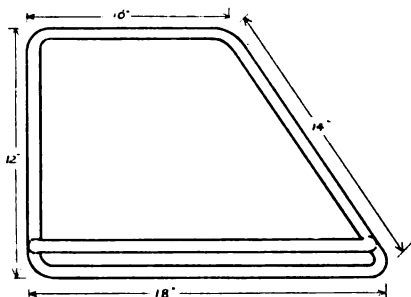
F. J. B., New York.

Tongs and Whiffletrees.—The accompanying engraving shows two different ways of making blacksmiths tongs. At A is shown the way most smiths make them and you can go into almost any shop in the country and find a lot of tongs with one jaw gone; all broken at the same place—that is at the dotted line as per the arrow. At B is shown the way that I make my tongs and I have never had a broken pair of tongs in my shop, and I have run a shop for forty years.

I will tell you the way that I make whiffletrees for the framers or for any one that wants a good job: I take a piece of good timber according to what they are to be used for. For heavy work I make the piece two by three in the center and straight on the back and square at the ends and round the back and front



excepting the center. In front for about one inch, for this size, I use $\frac{3}{4}$ -inch front pull ferrules and hooks. For the center, I take a piece of 1 by $\frac{5}{16}$ -inch mild steel of sufficient length and make a clevis so the ends will take a $\frac{7}{16}$ -inch carriage bolt. Put a ring on the clevis and the job is complete and they are quickly made



A PLOW-SHARE HOLDER

and easy to repair, and I get the same for them that I would for any other kind.

R. R. TICHENOR, Minnesota.

A Letter from Missouri.—In a recent number was the very thing I wanted to know, the best and least trouble in running power tools, with a large motor or a motor for every tool. I have a jointer, rip saw, trip hammer, disc emery stand, all run from an eight horse-power gasoline engine. We have night current, but no day current. The town is going to put in day current, then I will use current. A motor for every tool costs more, but one has no belts and shafts to contend with. The wire costs less than belts and doesn't get out of repair as often as belts slipping and loose pulleys, and shafts out of line. All you need is to turn on the current and the tool begins to work; no oiling of shafts or boxing heating. Now, if you will lay a small channel on the floor, use this for the wire. Then the shop is clear of everything in the way of handling lumber. I am going to get a planer, an eighteen or twenty inch band saw and a turning lathe in a few months.

I make post hole diggers that can set a post in gumbo in four minutes. I also make wagon-box shoveling boards and do a general line of farm repairs. I don't find very much money in horseshoeing now. I came to this town six years ago. Then there were twenty head of driving horses besides two livery stables. Now there is one team of driving horses and one livery. The car has it all.

Let the farmer shoe. It takes a lot of hard work and responsibility off of you. Get in line on rebuilding spring wagons and such work. I rebuild five or ten every year and have no trouble selling them. A little paint and a few stripes takes the farmers' eye. Then a little talk on how much easier handling a spring wagon is than a lumber wagon and I sell one every time. I can do the work cheaply and make 200% on them.

O. R. MANVILLE, Missouri.

Cold Tire Setters and a Gas Engine Query.—I would like to hear from some of the craft who have used the Brooks' Cold Tire Setter, or any other makes of cold tire setters.

I am an automobile repairman and get some fine information from THE AMERICAN BLACKSMITH. Every man who has anything to do with an automobile should read it. When you learn anything about an automobile, you have received as much

value as THE AMERICAN BLACKSMITH would cost for a life time. I want to ask one question about a four-cylinder gas engine. When cylinder No. 1 and 4 are at the top center, and 2 and 3 are at the bottom center, are there any of the intake or exhaust valves open, and if so, why?

T. W. HOLT, Arkansas.

In Reply.—Regarding the four-cylinder engine; if the crank shaft is set at 180 degrees, i.e., that the throws for cylinders one and two are 180 degrees apart and that the pistons were so placed as to have two at the top and two at the bottom of the stroke, the inlet valves to the cylinders in which the pistons were located at the bottom of the stroke would be open. Correctly timed the inlet valve should open when the piston is eight degrees from the top of the cylinder and it should close at about 38 degrees after it has reached the bottom of the stroke. In other words, the suction stroke occupies about 210 degrees of the cycle.

You will therefore see, that two intake valves should be open on your four-cylinder motor if the motor and valves are timed correctly. With reference to the exhaust valve, would say that these should open about four degrees before the bottom of the piston travel is reached and they should close on top dead center.

S. B., New York.

Practical Shoeing Notes.—In reply to Brother Bundy: Use a bar shoe with plenty of frog pressure, trim hoof level. Use three nails on the side, draw lightly and see that the frog is soft before applying shoe. If the hoof is very dry and hard, use a pad with tar and okum or wool fat. If the horse does not come in contact with natural moisture, apply weak Neatsfoot oil or wool fat to coronet three or more times and under pads once per week. Rub in well around coronet. Apply it to the sole if pads are not used often. The causes of contraction and corns are in 90% of the cases lack of moisture and letting shoes on too long one per cent. accidental injury and four per cent. acids used for the cure of thrush. I would say that 5% of the causes we attribute to poor smithy work, poor shoeing, etc.

Brother smiths, if you have not tried the above method, do so now and be convinced. find it requires one year to affect a cure in most cases. In ordinary cases

Brother Morman; base narrow horses (hoof not deformed) should be lowered on outside, protected for wear with heavy outside calks. To shoe level or trim down inside of foot will cause horse to stand inside calk, not touching the floor. If base is wide, do the reverse.

By base wide, I allude to horses standing wide at stifle, feet close together and so in motion. If base is narrow, the reverse. I approve of your method described in the April issue.

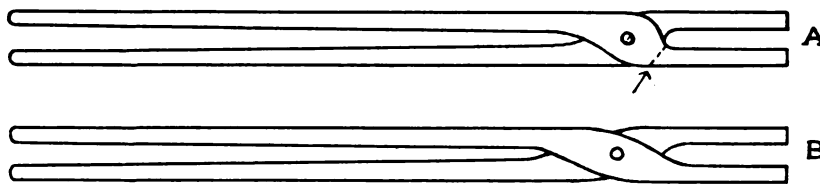
W. E. BINKLEY, Illinois.

Tempering Stone Hammers.—Could some brother smith tell me the best method for tempering hoof nippers and also stone hammers?

FRANK LEHNER, California.

In Reply.—With reference to the dressing of stone hammers, a great deal of this work is done throughout the country, but few men take sufficient interest in the work to study it and get a thorough understanding of it. The main trouble is in overheating and heating too quickly. By way of illustration of a poor method of heating: Many blacksmiths will take the hammer and plunge it into the center of the fire, no matter how hot the fire may be. What is the result? The corners of the work are heated too quickly, while the center remains almost cold. The strain which has taken place between two extremes has already caused a crack, though the crack is not visible. The hammer is again heated and hardened and presents a pretty good appearance, as no cracks can be seen. If the corners do not fly off by cutting, however, the cracks will appear the next time the hammer is dressed.

Let us take a more scientific way to treat the stone hammer for hardening as well as for dressing in the forge fire. Take the hammer and lay it in the top of the fire for a few minutes, without using the blast, letting the hammer heat slowly and bringing it to a red heat in order to be able to dress it. After dressing, use the same method again, allowing more time to get sufficient red heat (say about 1375 degrees, Fahrenheit, or 1400 degrees Fahrenheit), plunge it into brine not too strong, cool it off in brine (about $1\frac{1}{4}$ -inch from the end) and let it cool off entirely in oil.



MR. R. R. TICHENOR EXPLAINS THE CORRECT AND INCORRECT WAY TO MAKE TONGS

of corns, I merely relieve pressure on the shoe and level heels down. High heels are a detriment and easily contracted. Don't trim too closely or bleed corns. Don't spring the heels or shoes. The hoof will only settle to the shoe and I find is of no consequence. For broken down quarters, the whole and half bar have no equal. Try Brother Leonard's methods for these and be convinced of the merits of a bar shoe as a hoof spreader to affect a cure. The spreading must be done from the top of the hoof by frog pressure, nature's way. All weak quarters should be taken into consideration in trimming the foot.

Treat the other end in the same manner as the first, but be careful not to let the temper run to the hardened end. If necessary to draw the temper for hard stone, lay it on top of the fire and draw it slowly and, but very little, unless the steel is high carbon, in which case it may be drawn a little more.

Hammers treated in this manner will give better satisfaction than if the first method is used. It is of great importance for tool dressers and blacksmiths to remember to take sufficient time with the steel. It is time well spent and saves a whole lot of trouble, both for the smith and for his customer. C. W. Wisconsin.



Horseshoeing and Examinations.—I want to say to the Brother who has ridiculed the idea of one Philo Bundy, in regard to his idea of the principal of the bar shoe, that there is but one Philo Bundy that I know of, and I have (to satisfy myself to the mind of his idea) called on this Brother and I want to say to Brothers who made light of his subject and idea, that I know his idea is correct because I saw the animal he tried it on and the results are satisfactory and up to the minute. If they were not, why preach frog pressure? His idea of using the bar shoe is all right.

He put that bar shoe on his horse. He treated the feet himself, changing the shoe every two weeks, allowing one week to go without shoes, allowing the horse to stand on nothing but damp clay when shoes were off and to be on pasture when shoes were on. When the shoes were first applied, the foot at the heel measured 3½-inches, and when I saw the feet three weeks ago, they were perfect. It took six months to do this work, not six weeks. Navicular disease can be cured by the expansion of the foot in from six months to one year, but the horse must not be worked, and the feet must be attended to.

When you attempt to cure a diseased foot, don't try to cure it in a day. If a horse is put in your care, attend to it, and if you are a horse shoer, success will crown your efforts.

I was at the Peoria, Illinois, examination for horseshoers. I have been in the business for twenty-five years, but I had to be examined before I could get my license. I'd like to tell the brother of my experience, but I deem that the least said is the better. I arrived at Peoria on the second day of examination. Two hundred were examined on shoeing and the anatomy of the foot, eight men to each horse, one to fit the shoe, one man to trim and nail on, (to each foot). Several men were denied licenses. all had been in business from two to thirty years. Just think of it!

The highest per cent the examiner gave was 40 on shoeing, 40 on examination of the foot to fit shoe, trim and nail on 40%—20% for examination in anatomy of the foot, and ideas of shoeing 40%. But since, one took the fire and the other the foot 40—40 was the highest. It cost \$5.00 for license, and your expenses, if you didn't pass you were out your \$5.00 and expenses. I went 200 miles to be examined and to get my license. Two hundred examined each day for four days at \$5.00 per head is going some for Illinois, doesn't it?

Well, as I said before, let's not say much, but get back to some shoeing sense. Come on, you New Jersey Brother, tell us something. John Denbo, Illinois.

A letter from Iowa—I have been reading THE AMERICAN BLACKSMITH and other trade papers on this subject for 20 years and have learned a good many things from these different papers. I have found THE AMERICAN BLACKSMITH a most welcome comer for about four years and am now enclosing a check for \$5.00, for a 10-year subscription, as I expect to put in the rest of my life at the business. If I could write my experience at the business as I can talk it, I could probably help some of the brother craftsmen, as some of them have helped me through these columns. But I will endeavor to write as much as comes to my mind. I shall start from the first. I started to learn my trade when 16 years old and have followed it ever since and am 40 years old now.

So I think that I have at least had several experiences. I started for myself when I was 21 years old and have run my own business ever since employing from one to four men, besides myself. At present I employ two full fledged general or all-round men.

I find that it pays to keep the men and get them acquainted with your business and trade. I have at present one that has been with me for six years. At the present time there are three other shops in our town besides my own. Two of them only do shoeing and the other doesn't do anything but wagon and plow work. I am running the only general shop. We do anything that comes along from repairing a wheel barrow to an automobile and even do a little railroad work.

Well, there is one thing that I would like to see discussed and brought into every craftsman's mind, i. e. The Lien Law. Every other kind of a craft has a Lien Law, but us poor hard-working sinners. It seems that the average smith in the country is always easy on a fellow with a hard-luck story. He gives him the material and his time and gets nothing for it. Just such fellows and the slow pays keep the smith always hard up. Of course, the Lien Law would not keep a man from giving things away but the man that wanted to collect his money would have some recourse. I would like to have the Illinois Lien Law enacted in the state of Iowa. From what I have read of it, it is the best in my opinion.

H. O. WIESE, Iowa.



The Automobile Repairman

Tuning up the Automobile Motor

VICTOR W. PAGE, M. E.

If a car has been in service all winter, the engine is apt to need some attention to take care of a slight falling off in power which is inevitable, after the engine has been used for a season. The writer does not propose to discuss the entire overhauling process as it is assumed that the mechanic is called upon to tune up an engine which is not worn seriously as relates to the bearings and such essential parts as cylinders, pistons or rings. The owner will complain that the engine is sluggish

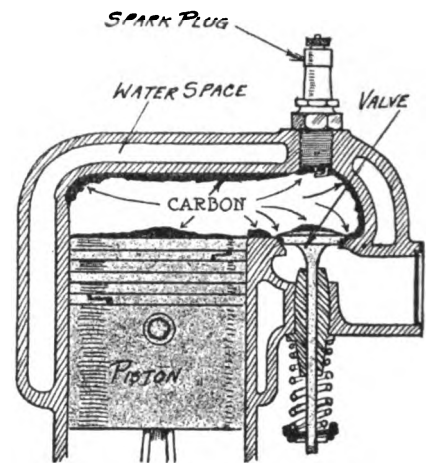


FIG. 1.—WHERE CARBON DEPOSIT MAY BE FOUND IN THE CYLINDERS

in action, that it does not climb hills as easily as it used to and that it is not so responsive to the throttle. Nine times out of ten, providing that the main mechanical parts are in reasonably good condition, the engine may be rejuvenated by cleaning the carbon out and grinding the valves as well as checking over the valve timing system.

Considering first the question of carbon removal, it is well to note that various liquid or powder removers that are widely advertised to clean an engine out thoroughly by the simple process of injecting them into a spark plug hole, then running the engine, have been found wanting by the writer in many respects. While some of these will remove the soft carbon, none of them will cut the hard, scale like formation that is the real trouble producer. If the engine is a type having a detachable cylinder head, the problem of carbon removal is a very simple one. The mere removal of the top of the cylinder block exposes the pistons, the valves and the combustion head so that the carbon may be easily scraped out. Very effective carbon scrapers may be made by bending steel key stock or drill rod at an angle and flattening out the bent piece so that a small tool like a hoe is made. Of course, when the cylinder head is removed the carbon may be easily scraped off with a putty knife or similar tool. On some types of engines the valve caps are sufficiently large so that when these are removed much of the carbon can be loosened by small hoe shaped scrapers introduced through the valve chamber.

A very successful method, if an oxy-acetylene welding outfit is included in the shop equipment, is to

burn out the carbon by means of a simple torch that is attached to the oxygen tank. Before using the torch the carbon deposit may be softened and made more readily combustible by putting a tablespoonful of kerosene in each cylinder and allowing this to soak into the carbon for an hour or two. The spark plugs and valve caps are removed from the cylinder and a lighted match or a wax taper is put in to start the combustion. The end of the torch is then inserted close to the flame and the oxygen turned on. In the presence of this oxygen the carbon takes fire and burns off leaving a fine powdery residue which is blown out through the exhaust valves as soon as the engine is run. In cases where the carbon formation is of long standing, the best way is to take the cylinders off altogether and to clean both the piston top and the combustion chamber interior by scraping.

The next step after the carbon is

understand the fine points of the process. The common error of the average person is to use improper abrasive material and too much pressure which results in the valve and valve seats being scored deeply. Valve removal is a very simple process, as any number of valve spring lifters have been marketed to make the operation of lifting the valve spring to release the key passing through the valve stem a simple matter. When the valve is removed, it should be examined to make sure that the stem is not bent or worn too much and that the head is not deeply pitted or scored. If the stem is bent it may be easily straightened, as indicated in Fig. 3. If the valve head is scored or pitted, it should be faced off before any attempt is made to grind it to a seat. Special valve head facing tools and valve seat reamers are now obtainable to fit practically all standard size valves and a set of these should be

Fine powdered emery or ground glass mixed with lard oil, kerosene, or light machine oil to the consistency of a thick paste are ideal abra-

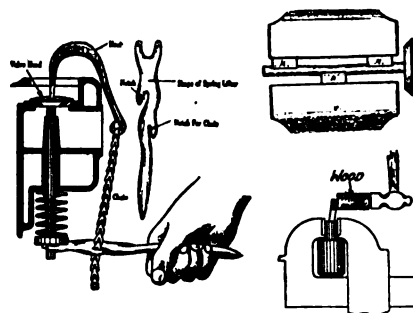


FIG. 3.—VALVES SHOULD ALSO RECEIVE PROPER ATTENTION

sives. They are not so apt to bunch or ball up as the coarse emery is and will produce a much smoother seat, in the cylinder and surface on the valve head. Only enough pressure should be used in turning the valve to keep it seated against the abrasive material spread on the seat. The valve should not be rotated in one direction continuously, but should be lifted from time to time in order to spread the abrasive and the surface is obtained by oscillating the valve head through a complete revolution in one direction followed by an immediate reversal in the other. It is necessary to place a ball of waste or cloth between the valve chambers and the cylinder interior to prevent any of the emery getting into the cylinder. After the valve has been oscillated back and forth for several minutes, it should be lifted out and the abrasive cleaned off the valve head and valve seat and new grinding material supplied. As soon as a smooth ring is present all around the valve head showing that there is full contact with the valve seat, the valve may be said to be fitted properly. The truth of seating may be verified by using a little Prussian blue pigment and smearing it in a thin uniform layer around the valve head. The valve is then dropped in place in the seat and is given about a quarter turn, then removed. If the color shows uniformly on all parts of the valve seat it indicates that the grinding has been correctly done. If high spots still remain these will be indicated by a surplus of color while the low spots will show practically no color.

After the valves have been ground in the next thing to do in the tuning-up process is to check over the valve timing carefully. After an engine has been in use for a period of time the clearance between the

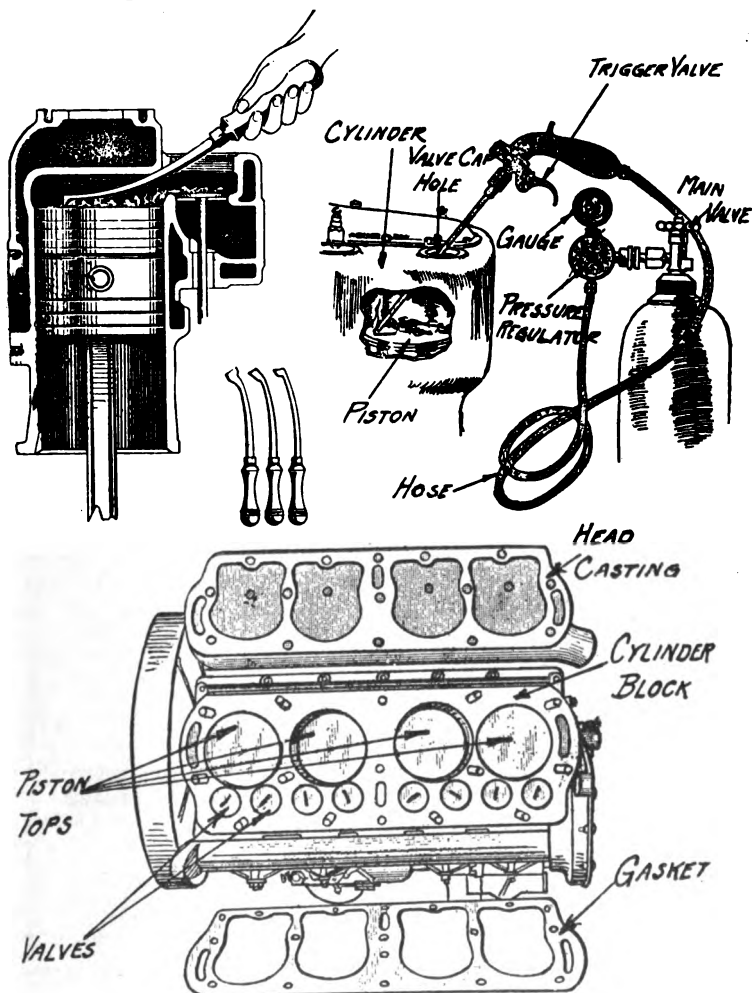


FIG. 2.—THE REMOVAL OF THE CARBON DEPOSIT IS IMPORTANT TO THE EFFICIENT OPERATION OF THE MOTOR

removed is to grind the valves. While this process seems to be a relatively simple one it is a surprising thing that few repair men really

part of the repair shop equipment.

After the valve and seat have both been properly faced off it is possible to undertake the grinding process.



valve stem lifters and the end of the valve stems becomes excessive. This not only makes a noisy engine, but causes a diminution in power because the valve opens late and closes early. Some of the valve lift plungers are provided with fibre insets



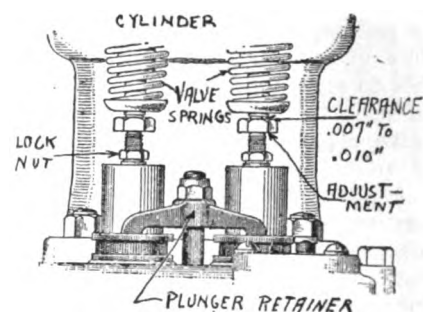
which pound out in time, but which have the advantage of being easily renewed for a few cents. They are picked out with the point of a knife and the new fibre discs which cost about one cent apiece are driven in place and smoothed off. On other types of engines the valve lift plungers have hardened adjusting screws and the only way these can be fixed is to remove them and grind the head smooth, this reducing any shoulder that might prove misleading when gauging the clearance space. On some of the lighter, cheaper engines, such as used on the Ford car, the only adjustment possible is by drawing down the valve stems to take up the clearance or by using a simple adjuster composed of a small thimble designed to fit on the bottom of the valve stem. A number of thin disc shaped shims are put in the bottom of the thimble to take up the excessive clearance.

Fortunately, practically all engines have the valve timing marks clearly indicated on the flywheel rim. These are registered with a trammel which is usually on the vertical center line of the engine and attached to the crank case. The operation of verifying the timing is relatively simple, though it must be carried on in a conscientious way if proper results are to be expected. On a four cylinder engine the flywheel is marked with letters I. O., meaning inlet opens; I. C.

inlet closes; E. O. which indicates the opening point of the exhaust valve for the cylinders marked and E. C. which shows the closing point of the exhaust valve for the cylinders marked. On a four cylinder engine two sets of marks are provided, one for cylinders 1 and 4 and one for cylinders 2 and 3. This is because the arrangement of a four cylinder crankshaft is such that two of the pistons are on the same plane. The flywheel is turned until the mark, "I.O. 1 and 4" is at the top and registering with the trammel. The inlet valve lift plunger on cylinder 1 is examined to see if it is about to lift the valve. If it is not, it is the plunger on cylinder 4, that should be in contact with the valve stem. At this point all of the clearance between the valve stem and plunger should be taken up. Continuing to turn the flywheel until the line "I.C. 1 and 4" registers with the trammel we should find that the valve lift plunger that has just raised the valve is just about to leave the valve stem.

If there is an appreciable clearance between the valve stem and lifter at this point the adjusting screw on the valve lifter should be screwed up to compensate for lost motion. If, however, the lifter remains in contact with the valve stem, after the closing point is reached, the adjusting screw should be slacked off. This operation should be repeated with each valve in turn. Previous discussions in these columns have covered the subject of valve timing to some extent. The excuse for reviewing the matter at this time is to emphasize the neces-

sary and efficient ignition are just as important in obtaining proper output as the adjustment of the engine parts is. However, the adjust-

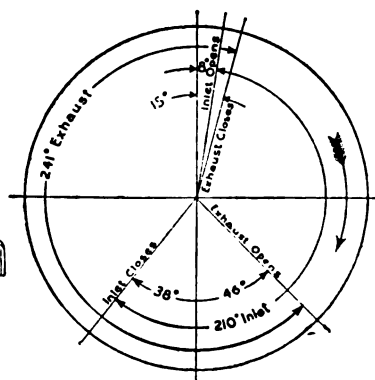
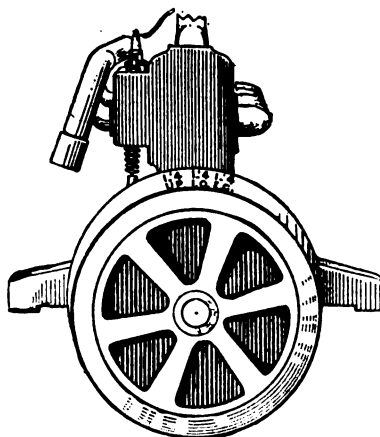


THE VALVE STEMS SHOULD BE PROPERLY ADJUSTED

ment of the auxiliary members of the power plant will be described in a later installment. The amount of clearance permitted between the valve stem and the valve lifter depends entirely upon the design of the engine. If the engine is a high speed type having a long valve that is liable to get hot, more space must be allowed than in an engine where the valve stem is not apt to expand to any extent. A clearance of .007 inches is enough for the average inlet valve while a space of .010 inches is adequate for exhaust valves.

To Test Turpentine. Take a piece of clean white paper and place a drop or two of the turps on it. Then expose the paper to the air to dry the spots. If there is no trace of the spots left you may be sure the turpentine is pure. But if the paper shows traces of grease you will know that the liquid contains oil or other foreign matter that should not be in it.

To Drill Cast Steel. Heat the steel to a cherry red and then bury it in slack lime

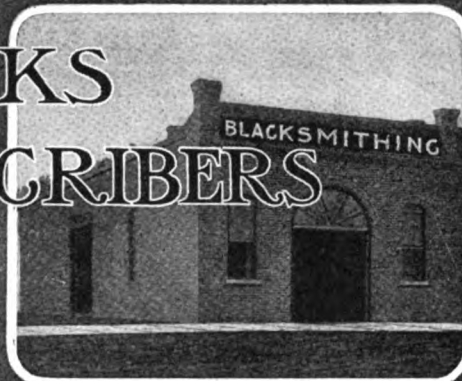


AFTER THE VALVES HAVE BEEN GROUND THEIR TIMING SHOULD BE CAREFULLY CHECKED

sity for adjusting the clearances accurately if the best power output is to be obtained from the engine. Of course, proper carburetor adjust-

ment until cool or over night if time permits—then drill. Another stunt is recommended by a good smith is to drill in the regular way using gum camphor and turpentine instead of oil as a drill lubricant.

TIMELY TALKS WITH OUR SUBSCRIBERS



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Have you called upon your neighbor smith (if he is not a subscriber to THE AMERICAN BLACKSMITH) presented him with a copy of "Our Journal", and asked him how he can afford not to become a regular reader? You know what the paper has done for you and what it is doing for the craft all of the time. You know how it has helped raise the standard of blacksmithing, how it has put the craft upon a better footing, how it has worked for needed reforms and how it has been working for the interest of the craft in general and its readers in particular ever since its beginning.

Why not tell your neighbor about these things? Tell him about the articles in the paper and the help that the Subscriber's Service Bureau is continually giving.

We will make it worth your while to secure new subscriptions for us. For each new subscription you send us we will either give you six month's credit upon your subscription account or send you a real man's size pocket knife.

Don't you think it worth your while to talk to your neighbor?

WRITE US A LETTER.

Will you tell us frankly and honestly what you think of THE AMERICAN BLACKSMITH? We want to know just exactly what your ideas are regarding "Our Journal." Is the paper meeting with your ideas, is it supplying your needs and wants, is it giving you the information you want? We want to know just how close THE AMERICAN BLACKSMITH comes to being your idea of what a blacksmith paper should be. We want to know what changes you would suggest in order to improve THE AMERICAN BLACKSMITH.

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When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication insist upon him showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—Don't Give Him Your Money If You Are Not Sure.

Contents, July, 1916

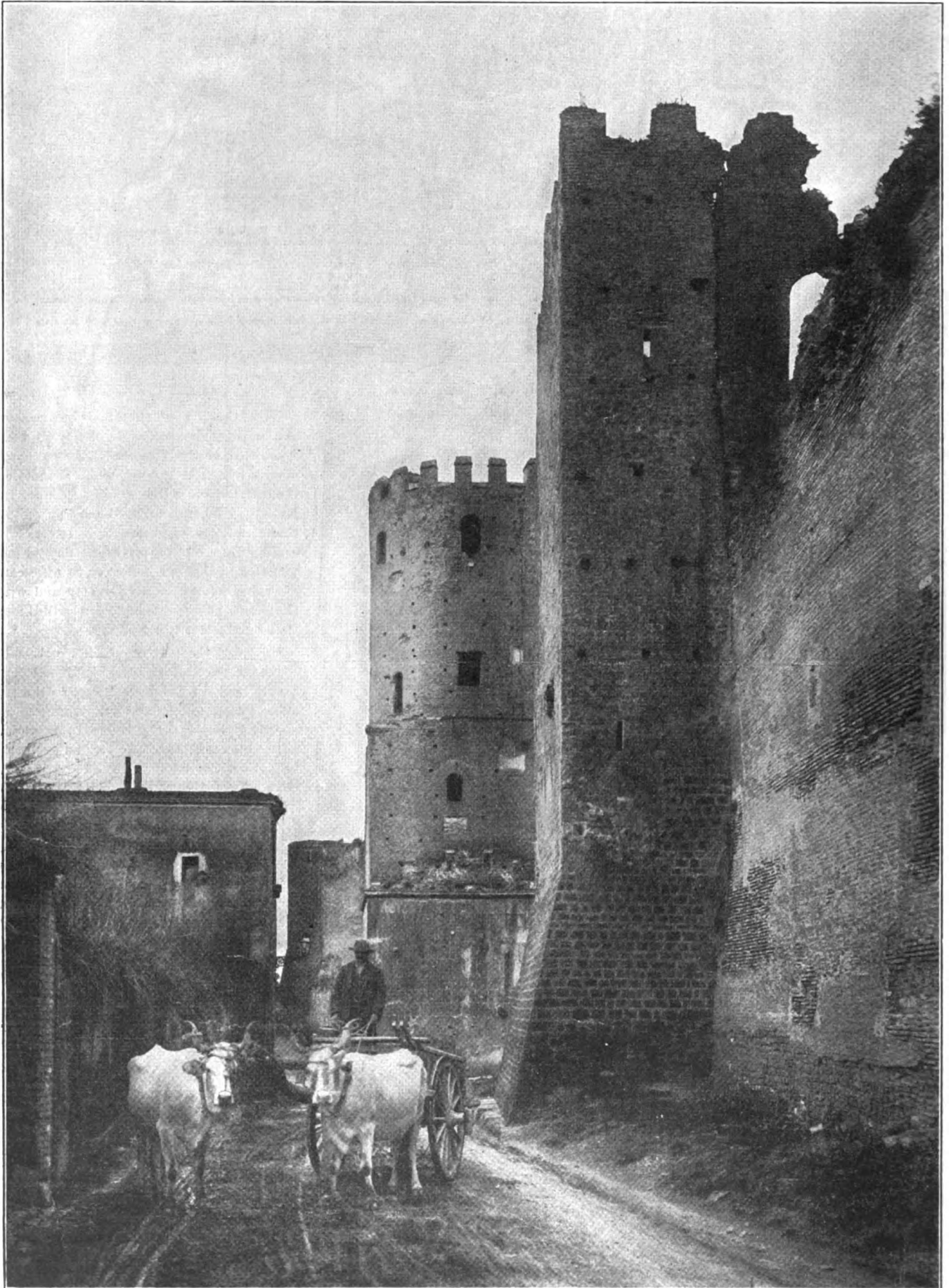
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PROMPT REPLIES

With the list of thousands of readers and with thousands of accounts to take care of, it is almost impossible that some mistakes should not occur in conducting the affairs of a business such as THE AMERICAN BLACKSMITH. When you realize that hundreds of orders and letters are coming into our offices every day—when you realize that we endeavor to take care of each day's business promptly and with the least possible delay, you will know that our task is a big one.

However, the matter which we wish to speak of particularly at this time is our promptness in acknowledging receipt of subscription orders and remittances. We endeavor as far as possible to acknowledge a remittance or a subscription order within twenty-four hours of its receipt in our offices. Even in the periods of our greatest rush, the time elapsing between the arrival of your order or remittance is very seldom more than this. Therefore, if you do not receive a prompt acknowledgment of your subscription order or any other remittance which you may have made direct to us or through one of our agents, write to us and tell us about it. Of course, you realize that in the case of an order sent in through one of our agents, some little time will elapse before the agents forwards the order to us. This time, however, should in no case, be more than a week and the minute your order comes into the office, an acknowledgment card is sent you.

There is always a possible chance of a letter being lost in the mails. There is always a possibility of a solicitor overlooking your order. We therefore suggest that you notify us promptly if you do not receive a prompt acknowledgment of your order or remittance. In this connection, we might mention the fact that it is always safer to send a postal money order or an express money order rather than currency, through the mail. Our readers can help us considerably in making our service still better and still more efficient.



THE OLD FORTIFICATIONS OF ROME. THE WALL IS OVER TWO THOUSANDS YEARS OLD. THE BULLOCK CART IS OF MODERN STYLE



The Smith Shop of the Future

How will it be Equipped? What Work will it do? Who will Run it?

J. G. WILLIAMS.

IN these days of motor cars, trucks and tractors and their increasing popularity and use, it seems but natural to ask concerning the future of the smith, the horseshoer and the general repair man. What will the blacksmith of the future do? What will he need to know? What will the smith shop of the future be like? These are questions folks generally are asking and they are questions



MR. RALPH KEENEY'S COLORADO SHOEING SHOP

that vitally interest and concern the blacksmith, the horseshoer, the wagon or carriage builder and the general repair man.

In the current issue of one of the magazines of the day is published an article entitled: "Where are the Smiths of Yesterday?" The writer of the article calls attention to the lack of competent smiths. He asks: "What is to become of the good old trade of the blacksmith, now so overshadowed by the chauffeur, repair man and mechanism?"

Of course, there are still plenty of blacksmiths and there are still plenty of competent men who can shoe a horse properly, who can set a tire properly, or if need be, build a wheel or build a wagon or carriage. But the numbers of these competent men, these masters of the craft who long since graduated from the College of Experience are growing fewer each day. Modern progress is changing things. The automobile has come, the truck is growing and

the tractor is just beginning to be seen. In the smith shop electric power is being installed, the oxy-acetylene torch is being used. The old-time shop of labor and heavy toil has been transformed into a plant of power machines and modern efficiency.

The blacksmith who has been doing a general line of work including horseshoeing, general blacksmithing, wagon, carriage and buggy repairing and building, will need to grasp the opportunities that are presented to him and enlarge his field of activities. There is no longer a question regarding the smith's ability to do automobile work and there is no longer any question regarding the blacksmith's ability to adapt himself and his business to the needs and requirements of the automobile, the tractor and the trucks. The smith must, if he is not content to accept a diminishing volume of business, grasp these problems that are presented to him by modern progress and solve them for himself.

But what will this craftsman of the future be?

He will need to remember what

he knows now: How to shoe a horse, how to repair a wagon, how to set a tire, how to point a plow, how to fix a carriage.

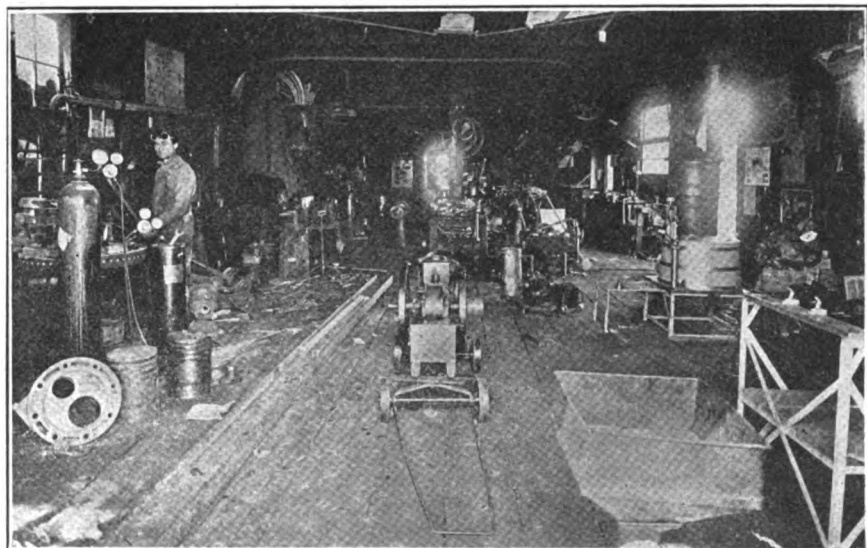
He will need to learn the automobile, the truck and the tractor.

His shop will contain not only a forge and anvil, a shoeing vise, a drill and a work bench, but he will add a lathe, an oxy-acetylene plant, a cylinder boring machine and perhaps gasoline and lubricating oil tanks.

This craftsman will be prepared. He will be in readiness to grasp any opportunities presented to him by the march of progress. He will not be the shop owner, who five, ten or fifteen years from now is going to say: "The gasoline motor has taken my trade and business away."

The blacksmithing business is growing and expanding and improving. A readjustment is taking place. Those craftsmen who have subdued their personal preference and who have harkened unto the calls of progress are the men who find business excellent these days.

In order to get some idea of the future as regards the automobile



A WELL EQUIPPED GENERAL SHOP OF NEBRASKA RUN BY FRANK HOLAN



motor truck and the tractor, let us consider some actual figures. The total number of motor cars and motor trucks registered in the United States last year was 2,423,788. And this year the manufacturers of automobiles and motor trucks have thus far sold more machines than ever before in the history of the industry. The manufacturers of tractors, of which the number has doubled within the last few years, are selling machines just as fast as they can turn them out.

All of these machines—automobile trucks and tractors—will need repairing, overhauling and adjusting. The owners cannot do all of this work. A great deal of it will be brought to the blacksmith who is equipped, both intellectually and mechanically, to handle this work.

The manner in which the individual smith and smith shop owner solves this problem of progress depends upon the individual and local conditions. If the general smith feels the need of an automobile and tractor repair man; if he is called upon to do this work; if he is asked to supply auto and tractor accessories, then surely he needs no further hint of what he should do, even though there be a garage and auto repair shop in his town or neighborhood. He should bear in mind that the motor vehicle field is still in its infancy, and that it is growing and will continue to grow for some time to come.

The tractor is just beginning to

Are you prepared to take advantage of the opportunities presented by modern progress, or are you going to say, five or ten years from now, that the motor vehicle put you out of business?

An Iowa Shop and Price List

GUNARD GULLGREN

I am sending you a picture of my shop, and also my oxy-acetylene welding machine. The picture shows a crank-case out of a 60-H.P. gas tractor. This case weighs a ton. A new one would cost \$250.00. I welded it and made it just as good as new for \$40.00. (Does it pay to weld?) The man that you see are all working for me (The boss holds the torch). I will send you some of our prices, as I always enjoy reading prices from other places.

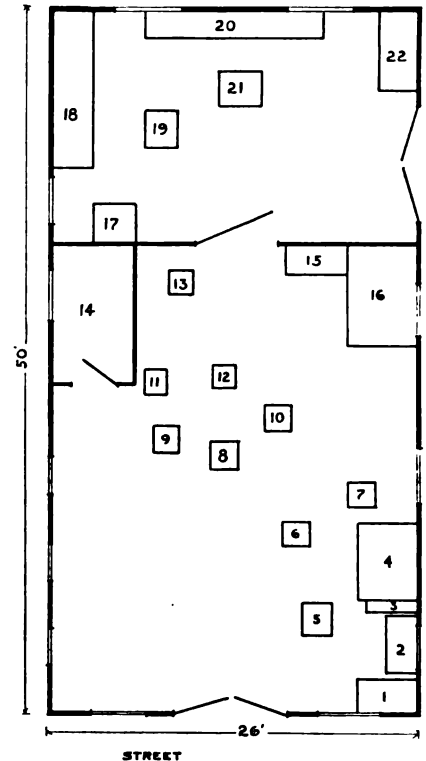
We get 25 cents for setting a shoe, 50 cents for a new shoe, and \$5.00 a set for steel plugged shoes; Never-slip the same. Race horses all the way from \$3.00 to \$5.00; 10 cents a blade for discs; sharpening plow lays, 12-inch, 75 cents; 14-inch, 85 cents; 16-inch, 90 cents; 18-inch, \$1.00; pointing, \$1.50. We harden and polish all the plows. New wagon tongues, \$3.50; spokes, 25 cts.; felloes, 35 cts.; half rims in buggies, 80 cts.; in wagons, \$1.00; sharpening shovels, \$1.50; pointing, \$2.50.

And oxy-acetylene welding, believe me, boys, it is the best money-maker in the shop, and the way things are going now we have almost

An Iowa Shop and How Its Owner Solved the Auto Repair Problem

E. L. PARDEE

The accompanying diagram shows the location of the various machines making-up my equipment. I do all

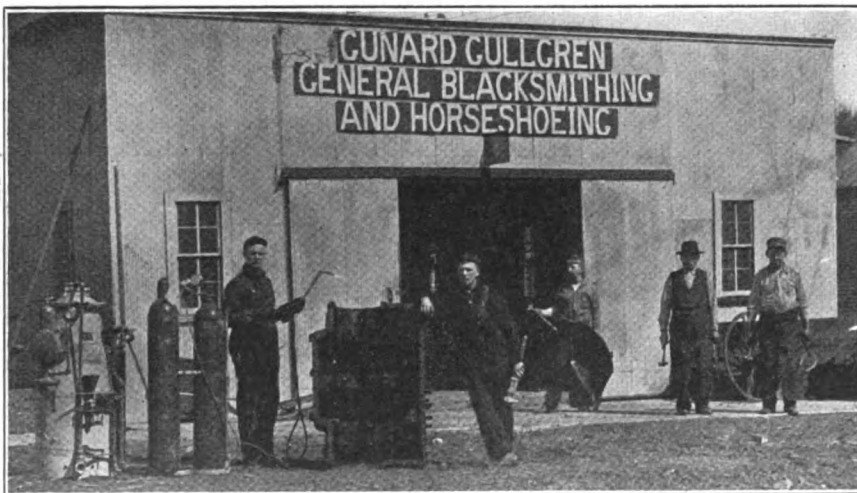


THE FLOOR PLAN OF MR. E. L. PARDEE'S SHOP

kinds of blacksmithing, horseshoeing, woodworking and automobile repairing. I have been doing automobile repair work for years and will tell how I manage it. I take care of the smith work in the smith shop shown in the diagram. I have a partner who does the automobile repairing. The garage and auto shop is located just across the alley from the smith shop, so I can be at either place as I am needed.

The automobile repair business is a very peculiar proposition but I believe the general smith has got hold of it in many sections. We carry some accessories, oils and gasoline. We rebore cylinders, and put in oversize pistons and rings. We repair radiators, do pipe work, store cars, and in fact do any and all kinds of work in the auto line, but sell cars. Our equipment in the garage consists of a drill press, grinder, vises, pipe tools, reboring outfit, an 18-inch lathe, a chain hoist and the necessary small tools.

The equipment in the smith shop is shown in the floor plan. No. 1



MR. GULLGREN BELIEVES IN BEING PROGRESSIVE. HE IS HOLDING THE OXY-ACETYLENE TORCH

make its mark in the field of agriculture. The manufacturers and farmers are still experimenting, but when their problems are solved, the popularity of the tractor will be second only to that of the automobile.

got to have a welding machine or take the back seat. I have a Vulcan made in Minneapolis, Minn., and there is nothing too big or small. It will weld anything from a finger ring to a locomotive drive wheel.



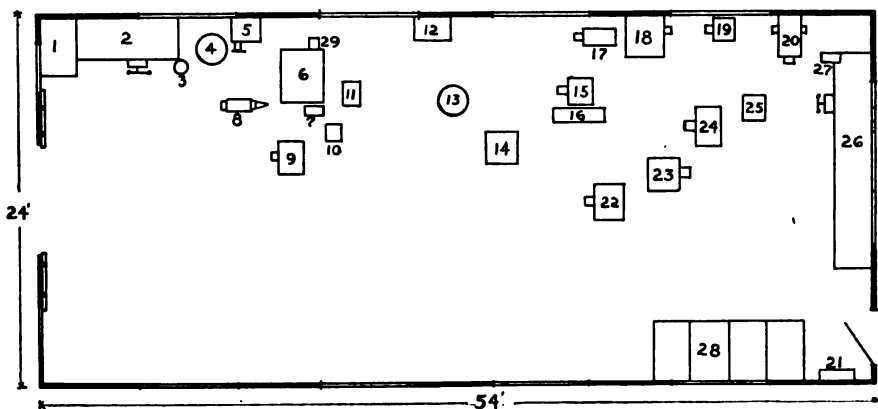
represents the desk; No. 2, tool rack; No. 3, vise bench; No. 4, forge; No. 5, anvil; No. 6, power hammer; No. 7, tire shrinker; No. 8, iron shear; No. 9, punch; No. 10, disc sharpener; No. 11, tire bender; No. 12,

then I have added the trip hammer, the thread cutting machine and boring and tenoning machine, and the motor still does the work in fine shape. As may be judged from my equipment, I do a general smithing

suitable for the different varnishes and have experts who can melt these gums without scorching them, and he must supply these experts with properly refined and aged linseed oil, having all the foots abstracted in order to get a uniform drying varnish. He must use turpentine to properly thin out the varnish, and then he must have the proper facilities for filtering the product before it is placed in the aging tanks to be used from three to eighteen months depending upon the quality of the varnish. When we consider the millions of gallons of varnish made, it is easy to see the vast sums of money necessary in order to keep a stock of properly aged goods on hand at all times.

There is, from a certain class, a demand for very heavy bodied varnishes. These heavy varnishes the better class of varnish makers hesitate to send out owing to fact that they invariably cause trouble. They are not bodied up as a rule with high-grade gums, because the price will not admit of it. They do not dry through like a varnish with medium body. They are much more likely to crack when they are dry, and the varnish maker, who feels his responsibility to the user of his product, avoids the sale of them as far as possible.

The varnish maker, is then held responsible for producing an article that is made of the proper gum,



HOW MR. C. H. SANDSTONE'S EQUIPMENT IS ARRANGED IN HIS YORK STATE SHOP

drill press; No. 13, polishing wheel; No. 14, engine room; No. 15, bolt rack; No. 16, oxy-acetylene plant; No. 17, band saw; No. 18, wood rack; No. 19, tenoning machine; No. 20, wood bench; No. 21, wheel block; No. 22, felloe and spoke rack.

A Well Equipped Electrically Operated Shop of New York State

C. H. SANDSTONE.

The accompanying engraving shows an exterior view of my shop which is 24 by 54 feet. The shop is well-equipped with power machines, the location of which can be determined in the floor plan. I have electric power and light and city water. In the floor plan: No. 1, represents the desk; No. 2, iron bench; No. 3, coul; No. 4, slack tub; No. 5, shoeing vise and bench; No. 6, Buffalo Forge No. 660; No. 7, tire upsetter; No. 8, anvil; No. 9, trip hammer; No. 10, iron shear; No. 11, tire bender; No. 12, wardrobe; No. 13, stove; No. 14, hole in floor for setting tires; No. 15, drill; No. 16, wheel pit and tire cooler; No. 17, thread cutting machine; No. 18, a three horsepower Fairbanks-Morse motor; No. 19, emery grinder; No. 20, boring and tenoning machine; No. 21, bolt rack; No. 22, 20-inch band saw; No. 23, rip saw; No. 24, 8-inch planer; No. 25, wheel horse; No. 26, wood bench; No. 27, Reynold's tire bolter; No. 28, lumber rack on brackets six feet from floor and No. 29, electric blower. When I got my motor two years ago I only had five power machines. Since

business; blacksmithing, horseshoeing and wood work.

Varnish Troubles and Their Causes

A. D. HOAGG.

Varnish troubles may be summarized as follows: Cracking or crazing, blooming, turning white, sinking, or becoming dead, and losing its gloss sweating, pin-holes, wrinkling crawling, blistering, and failing to flow out, etc.

The great question is: "Who is



THE NEAT APPEARING GENERAL SHOP OF MR. C. H. SANDSTONE OF YORK STATE

responsible for all these troubles? We will first consider the responsibility of the manufacturer. If he expects to continue and prosper in business by selling to the best mechanics, he must select the best gums

that contains enough refined and aged linseed oil to give it the necessary elasticity as well as long life, and is aged in the aging tank, after it is made, to give it the fine flowing qualities all high-class varnishes



should have. The varnish maker, who feels his responsibility to the user of this product will surely produce a thoroughly combined and ripened article.

A varnish maker, then, should be held responsible if he furnishes a high-priced varnish, the gum of which is rosin, and that contains very little oil and practically is not aged at all. This is the class of goods that by veen the most careful handling will crack, craze and turn white.

Varnish is the most delicate of all finishing material, and troubles very often come up with the best of finishers. Here is where the master painter's responsibilities come in.

There is a cause for all effects. You expect cheap varnish to crack or craze, but when you are using a good varnish you wonder why it cracks or crazes.

Cracking or Crazing.—This trouble is sometimes caused by subjecting a varnished surface to a severe change of temperature at a time when the varnish is not thoroughly dry and hard. An inexpensive varnish, if flowed on too heavy, is very liable to crack.

Again, if a slow-drying varnish is applied over a quick-drying var-

nish, the finish is almost sure to crack. The safe plan in all cases is to use the same quality from start to finish. The use of two entirely different drying varnishes on the same surface is, in my opinion, the height of folly. The practice of using a cheap first-coater and an elastic or

long-oil varnish for the finishing varnish is the cause of much grief to the varnish. I might add the practice of using shellac as a first-coater is bad because shellac, even when pure, is very brittle, and it prevents the varnish from penetrating the wood, and, here, like all finishing, the ground or first coat is important one if you expect to have a lasting job.

Most of the crazing, even on our fine pianos, is caused by use of shellac for an undercoat, and I wish to add that no mechanic can use shellac successfully as a first coat no matter how good the varnish may be that he applies over it, because if any water is allowed to stand on the surface for a short time, the surface will spot.

Some makers say in their literature: "Do not interfere in anyway with this varnish by thinning it—use it as it comes from the can." This is correct as far as second and third coats are concerned, but on hard woods like maple and oak, the first coat should always be thinned by adding at least twenty-five per cent. pure turpentine. This carries the varnish right into the wood and makes a better surface for succeeding coats than anything you can use. Of course, it will not dry quickly like shellac, but when it is dry, you have an elastic undercoat that becomes a part of the succeeding coats, and you will have no trouble with checking or crazing.

Blooming.—Means that bluish film or cloud that comes over the varnish. The finest of varnishes are liable to bloom under certain conditions; gases escaping in or through the varnishing room, sometimes coming from a basement that is not properly ventilated, will cause the varnish to bloom.

A master painter of this city called me to look a school building over. He had varnished all the walls of the first story and on just one side of the building the varnish had bloomed badly; on the other three sides the varnish looked perfect. The secret of the trouble was that gas was coming up from the basement, the openings being on that side of the room, and a beautiful blue cast was spread over the wall, but it was not the fault of the varnish.

Varnish Turning White.—Of course, a cheap rosin varnish will turn white if moisture comes in contact with it, but any varnish, no matter how expensive, will turn white if applied over liquid wood

filler, because when water is allowed to remain on the surface a few hours, the moisture will penetrate through the varnish and the white in the liquid filler will in turn reflect through; moreover, it will scratch white—liquid filler and shellac are very much alike in this respect—



O. R. MANVILLE WITH WHEEL BEFORE HIS MISSOURI SHOP

both seal the pores and the varnish simply lies on top, but does not penetrate through the wood.

Sinking or Turning Dead.—On open grain wood, where a poor quality of paste wood-filler is used, the better the varnish the more likely it is to sink and lose its gloss. In many cases this sinking is caused by thinning the varnish from start to finish; in other cases the trouble is caused by applying the succeeding coat before the undercoat is dry and hard.

Sweating.—The trouble is generally caused by rubbing the varnish before it is dry and hard all the way through. A long oil-varnish is very liable to sweat because it requires a number of days to dry hard. It is naturally a slow dryer.

Pin Holes.—Pin-holes are mostly the result of improper or careless filling. On close-grain woodwork where no filler is used the first coat of varnish has not been through properly, and consequently does not penetrate the wood as it should. The result is a series of little pin-holes where the varnish goes in.

Wrinkling.—Wrinkling is caused by applying too heavy a coat of varnish, which often happens when using a heavy-bodied varnish.

A varnish will frequently wrinkle if exposed to a great change of temperature while it is drying.

Crawling.—By crawling, I mean that the varnish will not stay where you put it. This is a very common complaint with those doing new houses, particularly in the winter season. The plaster is wet and cold, a fire is started, the heat draws the moisture from the walls and a film



BUDD STURZEL, OF WISCONSIN, AND HIS GENERAL SHOP

nish, the finish is almost sure to crack. The safe plan in all cases is to use the same quality from start to finish. The use of two entirely different drying varnishes on the same surface is, in my opinion, the height of folly. The practice of using a cheap first-coater and an elastic or



AN AXLE GAUGE THAT WILL SAVE TIME AND TROUBLE, SUGGESTED BY MR. BUNDY

of lime-water settles on the wood-work. All that is necessary to remedy this is to dip a rag in warm water, then rub it dry and the varnish will stay. Sometimes greasy or oily rags used for rubbing will cause crawling.

If the temperature is too low the varnish will not work well. To get the best results the varnish and the room should be about 70 degrees Fahrenheit.

Blistering.—This trouble is often caused by using an elastic varnish over shallacs as a first-coater, and if the surface is exposed to heat, or if the rays of the sun fall directly on the work, the shellac will soften and the varnish will blister.

Varnish that does not Flow.—If varnish is kept in a freezing atmosphere it will not flow freely and should not be applied until it has been warmed through. The easiest way to do this is to set the varnish-can in a pail of hot water.

If the can of varnish has been opened and exposed to the air for some time, the varnish will thicken, and it will not flow evenly again until it has been warmed and properly thinned with turpentine and allowed to stand for a few days.

A Trio of Hints for the General Smith

PHILO BUNDY

When on a job of plow pointing, make your first weld, then when you turn your front over to weld up the throat on top of the point, use a very small hammer with a long handle, and you will be surprised how easily you can do the job. By doing this you avoid the discomfort of the heat on your hands and you can hit several times faster and do a neater job.

Now I will tell two ways of making an axle gauge.

One way is to take a straight piece of oak, 1 by $\frac{3}{4}$ of an inch and about 5 feet 4 inches long. Put a screw six inches from the end. Now place on the axle, allowing the screw to touch the second collar next to the main collar. When this is done slip the stick to the end of the spindle (not on the thread) and make the end touch the screw. First gather front or bottom.

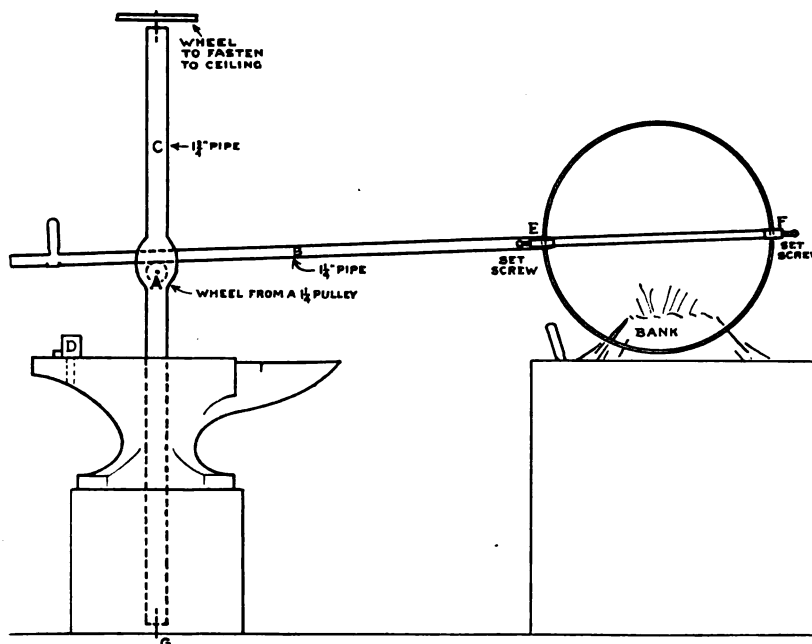
Another axle gauge is made as

shown in the engraving. Take a piece of oak 1 by $\frac{1}{4}$ -inch and 5 $\frac{1}{2}$ -feet long. Attach a piece on one end, as shown at B. Now forge a piece to slide on the beam. This is fitted with a thumb-screw as shown and is forged U-shaped on one side to permit it to fit over the axle.

A Labor Saving Device for Handling Heavy Tires

E. B.

This is a simple device to handle a wagon tire and also to hold the scarf in place while taking the heat. B is the porter bar, made of $1\frac{1}{4}$ -inch pipe with two clamps, F and E—E being adjustable to the opposite end of this. A handle is attached. At C is a post made of $1\frac{3}{4}$ -inch pipe with a pocket in the center, made of $2\frac{1}{2}$ iron, six inches long and welded on post. This pocket holds an ordinary pulley wheel, $1\frac{1}{4}$ -inch in size which makes a roller for the porter bar to turn on. The wheel at the top and threaded pin is to fasten to the ceiling in a socket. There is also a socket and pin at floor at G. At D is a tool to work the tire on two sides. With this device a boy can handle a tire or band of two or three hundred pounds while the smith does the welding. A similar device is used in all railroad shops for handling heavy work.



A LABOR SAVING DEVICE FOR THE HANDLING OF TIRES THAT IS EASILY MADE

Perfect Concrete and How to Make It.

NOTE.—The following article from a booklet issued by the Lehigh Portland Cement Company, should interest smiths who are contemplating the erection of a new shop building. This article answers many questions that are asked of "Our Subscriber's Service" department every building season.—Editor.

It would be useless to enter into any prescribed method for concrete construction, a score or more of valuable text books and manuals having already been issued, and no emanation of knowledge, however, learned, from the laboratory could take precedence over that gained through experience in the great workshop of the world.

We can, therefore, with perfect confidence, leave all matter pertaining to engineering skill in the hands of those who are so ably fulfilling the trust to their profession.

It is rather to the more obscure conditions surrounding the industry that attention is called: the use and misuse of cement, the potentiality of the material itself, and the limitation of its application; the errors and abuses, that, through design or ignorance, have been allowed to creep in.

The worker in the field has neither time nor inclination or finely spun theory, his handicap perhaps being an imperfect knowledge of the chemical properties of the material itself.

In brief review, the materials entering into concrete construction are:

- (1) Cement, (2) Sand, (3) Stone,
- (4) Water, (5) Steel and iron



(reinforced) and their related corollaries: Temperature, proportion, elementary functions—including the refractory fire-resisting properties—and waterproofing quality.

Cement

The selection of this need entail no hazard, if a well-recognized American brand be chosen, regard only being had for such which might appeal for a special admitted quality of excellence, such as a high, or subsequently high, tensile strength, uniformity of product as to color, composition, etc.

In connection with the possible selection of any American brand of reputed especial excellence, it would be well for the contractor or the engineer to verify any statements made by the manufacturer.

This caution is opportune, as new products are often foisted upon the public, ascribed with new virtues which really are as old as the hills.

Lending color to such pretensions, new machinery and a most scrupulous regard to conditions may impart a temporary distinction to a few barrels of cement. Subsequent wear and tear, however, effectually extinguish this quality. It is the prerogative of the engineer himself to determine whether he will accept the statements unchallenged.

To his work may be attached the odium imposed by credulity and indifference, if the material be other than claimed.

Sand

The essentials are briefly, that it be:

(1) Clean, (2) Coarse, (3) Sharp, (4) Graded, (5) Siliceous, (6) Pure.

of foreign material—organic matter, as roots, grass, leaves, grease, oil, tannic acid, etc.

Coarse, that a minimum of cement may attain a maximum of strength.

Sharp, that the angular grains will interlock, imparting strength and density.

Graded, that the voids be reduced to a minimum, effecting all of the above and inducing impermeability.

Siliceous, that the natural adjunct of lime, silica, the most important constituent, be present, inducing often a metathetical re-action, by which, in long periods of induration, a lime silicate is actually formed, imparting strength and durability. Interdicting crushed aluminous, basic, soft and unctuous rocks, such as slate, cement rock, serpentine, soapstone, argyllite, etc.

Pure, that it shall be sand actually, and not merely the form or appearance of such.

Eliminating disintegrated granite, gneiss, syenite, where the kaolinic contents due to the decomposition of the feldspathic constituents are largely present. Mica, talc, crystalline gypsum, and the foliated minerals are especially harmful, weakening the concrete, through inability to secure a bonding effect, frequently causing absolute failure.

Stone

The qualifications are that it be:

(1) Graded as to application, (2) Angular, (3) Hard, (4) Impermeable, (5) Refractory, or fire-resisting, (6) Dense.

Graded, fulfilling the same functions as graded sand, in a larger degree,

hardness, acting only as a binder, the aggregate imparting that function.

Impermeable, eliminating, to a certain extent, the absorption of water and frost.

Refractory, affording protection from the agency of intense heat and fire.

Prohibiting the use of rocks con-



THE SHOP OF JOHN F. BUYCE OF YORK STATE

taining a relatively large amount of water of constitution.

Of such as exfoliate or expand under the action of heat. Of all carbonates such as limestone, dolomite, etc.

All of which might cause destruction of the mass during conflagration, through rupture by expansion, by the liberation of carbonic acid gas, with subsequent conversion of the stone to basic oxides.

Aggregates

In this connection, trap, quartzite, compact sandstone, crushed gravel cobble, dolerite and kindred rocks would be eminently suitable for bank-vault or absolute fire-proof construction; intense heat could only in extremity cause a semi-vitrification of the exterior mass.

Dense, to promote solidity, impermeability and strength.

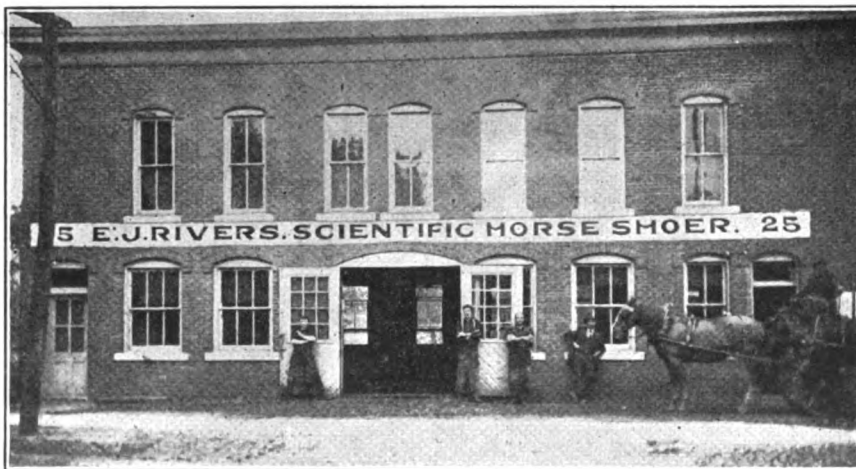
Rejecting all light, porous material, such as coal and fine coal ashes, tumaceous slag or cinders, slaty rocks, spongy or scoreaceous matter, etc.

Water

The latitude in respect to the water admixture is sufficiently wide to permit of a possible abuse.

However, regard should be had to the effects of certain impurities, which, while not causing absolute failure, may exert such functional disturbance as to impair or retard the progress of the work itself.

Reference is hereby had, when the supply may have a polluted source, to such as contain tannic acid or alkali waste, dye stuff, grease from washings of wool or animal products. The water of coal mines, often used, contains a very large percentage of sulphate of alumina and iron, due to



THE WELL-BUILT SHOEING SHOP OF E. J. RIVERS OF NEW YORK STATE

Clean, that a bond be effected between itself, the cement, and all the aggregate.

Interdicting the use of such which may contain an excess of clay and kaolin, an adherent film

promoting strength and solidity.

Angular, correlated to the same qualities as in the sand.

Hard, that strength be imparted and attritative effects minimized.

Cement imparts no property of



the decomposition of the shaly and pyritic matter present. This will result in a somewhat slow setting and hardening of the concrete, which may be accentuated should the sulphates be abundant.

An efflorescence, or blotchy effect, being eventually imparted to the exterior, through accumulation of alum, by capillary attraction, especially undesirable in decorative work. Other soluble salts in the water will have the same effect.

The action of grease, acid or alkali is understood without further reference.

Water from peaty reservoirs contains large amounts of tannic and other humic acids. Their use, while inadvisable, is not necessarily fatal to the work.

During very cold weather, the water should be heated to insure: First, an initial raising of the temperature of the mass, being supplemented later by the secondary rise in temperature due to molecular activity promoted during induration, thus preventing freezing.

An additional heating of all aggregate, further aiding this cause.

Should early hardening be desired, the water can be heated to boiling and thus applied, effecting the most expeditious procedure possible, especially if used in conjunction with heated aggregate.

Steel and Iron

The use and procedure in the application of these important adjuncts to successful concrete structure are so well understood by the skilled engineer as to render any reference superfluous.

Sufficient to say that the effects of possible electrolysis should be avoided by ground and insular protection primarily.

As oxidation of iron cannot proceed without moisture heat alone, unless intense, being unable to effect such—it is obvious that density and impermeability be primarily induced.

This can be effected by using a mixture rich in cement, well-graded aggregate, and a waterproofing application.

Process

The engineer, secure in the knowledge of his art, needs no instruction.

A reference, however, to the functions promoting success is almost imperative.

These include:

1. Cement; sufficient in quantity to attain the ends desired.
2. Correct proportioning of aggregate.

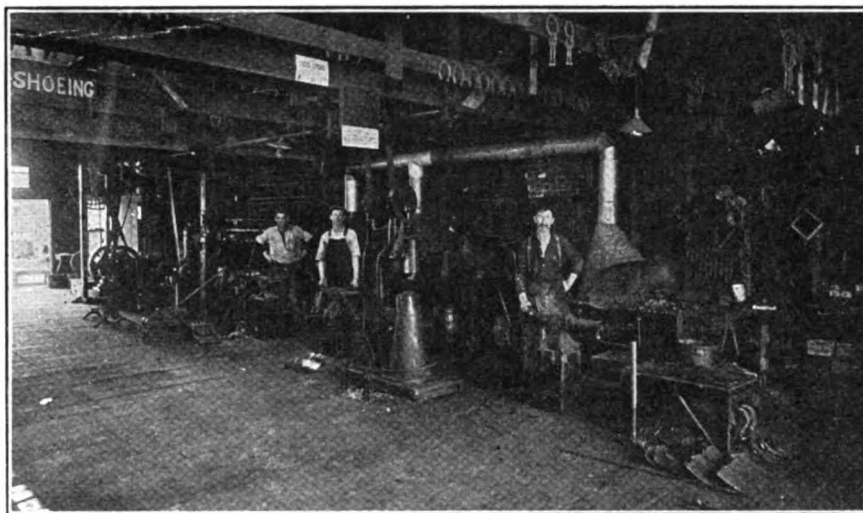
3. Adequate quantity of water, though not as much as to drown out the cement or to separate the material.
4. Elimination of voids by subsequent compression, etc.
5. Thorough mixing of all material.
6. Clean, wet and rough surfaces where bond is required, with

surface, giving subsequent rise to hair cracks.

Conclusion

As to the general practice of modern concrete construction, it can safely be admitted that most of the failures chronicled at rare intervals in the past can be ascribed to the inability to recognize a few well-known properties of matter.

Up to comparatively recent



THE WELL-EQUIPPED GENERAL SHOP OF C. W. COOPER OF NEBRASKA

- removal of all grease and laitance.
7. No application of concrete to heated surfaces, and avoidance of direct sunlight on light work.
8. Sufficient time for induration, especially in cold weather. (A possible cause for failure at times.)
9. Protection against wind and draughts, inducing premature drying out before final set.
10. Conduits provided for pressure or surface water, especially in tunnel or sewer work.
11. Water proofing methods of application, where such may be desirable or imperative.
12. Insulation from ground and induced currents to avoid electrolysis, destructive to reinforcing metal.
13. In ground work, foundation bed either dense enough to avoid, or porous enough to allow of drainage from work, avoiding stress and torsion due to frost.
14. Expansion joints.
15. Avoidance of undue troweling in pavement or light surface work, as tending to bring water and light material to

period, it had been the practice to ascribe all cases of failure to the cement itself. Now, a broad knowledge prevails in the engineering field, as to the effects of impurity in the aggregate, and the penalty attached to slovenly and crude method of application. The penurious policy of a mixture lean in cement is also now well understood and the penalty predicated. Cases of failure may still be forecast, but they can at once be placed in the category of wilful dishonesty or ignorance.

A Letter to Kansas Craftsmen from President Bohrer

President Ed. Bohrer's letter to the craftsmen of Kansas is one that may be read with profit by every craftsman in the country. The Kansas Association headed by President Bohrer is doing good work and every member of the trade in the Sunflower State should be working with President Bohrer at every turn.

President Bohrer's letter follows:

Craftsmen: Now that the winter has passed and we are all looking for a busy year, I hope most of you are looking forward to make the year a prosperous one to you.

We all should raise the price of our labor to a profitable margin. We should not make the effort to raise the price of everything we do, but we should do it.



Blacksmiths must be better paid for their work. It is a question of do or die in a business sense. Prices prevailing ten years ago will not today produce a living margin of profit, and yet there are many who, in spite of this, are working for the same prices, or even lower ones, than those of a decade ago.

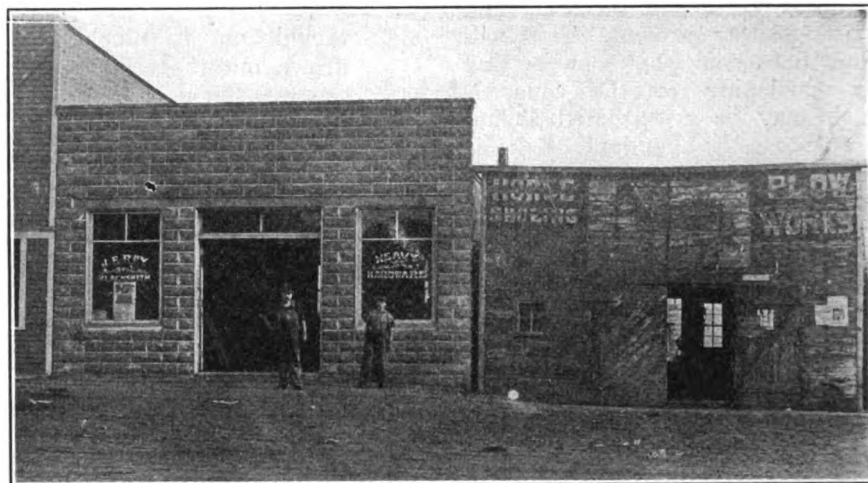
Very few shops, if any there are, who do not sincerely believe that they are not receiving proper remuneration for their labor. When shop work is reduced to the plane of day wages, and in some instances even lower, is it not high time that the shop-owners of Kansas take up this matter of improving conditions?

How much longer will the shop-owners of Kansas plod along under the burden of improper remuneration? How much longer are the knights of the anvil going to eke out a bare existence, run in debt, or be compelled to turn to some other occupation in order to make both ends meet? Is our profession or occupation to be lowered? Is merit to count for nothing—training, experience, skill, reliability—are they all to be ignored simply because the shopmen of Kansas are not loyal to their profession? How much are you willing to do to improve these conditions? These are questions which every smith and shop-owner should give his individual thinking along this line; the next step is easier.

It will require the sacrificing of thought, time, and perhaps some cash, to accomplish anything; but eventually it will prove to be the best investment we could make. I would also call your attention to the fact that the world's war has unsettled all industrial conditions in this country, goods and materials in all lines of trade have advanced very much, and in no line has this been more marked than in the iron and steel industries.

Even should the war stop now, and peace come at once, prices will continue to ride high and at a much higher level than before, as steel and iron mills have orders and contracts from six months to a year ahead, requiring their full capacity. So I appeal to you to raise your price to a plane that will give you a fair margin of profit.

I cannot refrain from calling your attention to the fact the welding machine has wrought a change in our profession. Men who could not do a hand's turn at the anvil are most proficient with this



THE OLD AND THE NEW SHOPS OF MR. J. E. RAY OF MINNESOTA

new method of uniting metals, and these men and all who work at any part of iron and steel repairing, should be classed among us.

And in order to make such men feel that they should be members with us I would suggest that the name of this association be changed from 'The Blacksmiths', 'Horseshoers' and 'Wagonmakers' of Kansas, to the plain and broad meaning name "The Vulcans of Kansas."

When this association was born the present name was a very fitting one, but in order to make our association grow and blossom as a Kansas sunflower we must take all metal mechanics in with us. Hence the name, "The Vulcans of Kansas."

And just one closing word, let me urge you, each and every one, to go to Topeka to the next convention and take as many with you as possible.

The Old and the New Shop of a Minnesota Smith

J. E. RAY

I am sending a picture of my establishment. The old shop is 22 by 48 feet in size and the new building is 26 by 60-feet with 12-foot ceiling and a cement floor with one-

inch boards on top for shoeing. I have about the usual outfit for a shop in the country. It consists of a Little Giant power hammer, a drill, a punch and shear, a hot tire shrinker, Scientific cold tire setter, one Clipper shear, one Simonson hot shear, Giant Wonder disc sharpener, Ideal lawnmower grinder, one six-horse Gairmont gas engine, one 1½-H. P. Fairbanks-Morse engine, one electric blower, one portable forge and an emery stand. We do all kinds of repair work and shoeing. We use the old shop for storage and plow grinding, also have store room twelve by twenty in which I keep most of my new stock.

A Portable Tool Cabinet

M. J. F.

The accompanying engraving shows a very handy tool cabinet and stand that any practical man can make. It is very handy for carrying tools and small parts right to the job and is especially suited for the use of the automobile repair smith.

The stand consists of a stack of drawers built into a stout frame which is placed on castors. It is well to have the drawers mounted on large wheeled casters that work on ball bearings so that the stand can be easily moved about.

The top of the stack of drawers is fitted with a round tray with a edge of thin material coming up above the surface of the tray proper. This tray or platform is fastened to the drawer stack in the center by means of a large screw or bolt and allowed to revolve so that any tools placed on the tray may easily be brought within reach by revolving the tray.

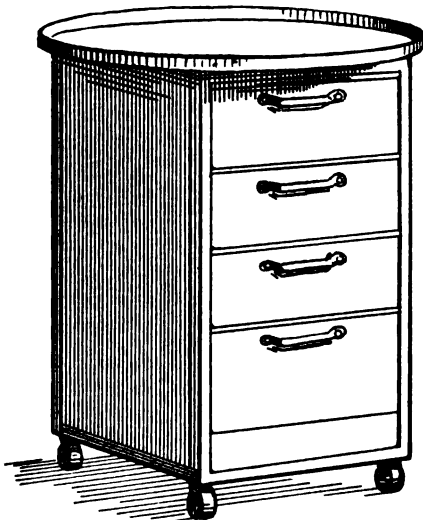
The drawers of the stand are used to hold small parts, nuts, bolts,



THE SHOPS OF P. A. STOHL, OF NEBRASKA, SHOW THAT HE IS A WIDE-AWAKE MEMBER OF THE CRAFT



screws, nails or any other supplies that you want in handy reach; while the revolving top is used to hold the tools you are using on the job. If the stand is used by the auto



A VERY HANDY TOOL CABINET AND STAND

repairman, he will find the drawers handy to hold parts of a motor when taking one of these down.

The drawers of the stand can be subdivided in almost any number of ways to suit the work on which it is to be used.

An Improvement for the Tire Shrinker

PHILO BUNDY

Those readers who have Mole shrinkers or one of that pattern will be interested in my little stunt to improve it.

It is an attachment very easy to make. All the users of the above mentioned style shrinkers know that they will slip the spring and that it becomes weak, and that there is no way to adjust it except to get a new one or let it go as it is.

The attachment is made of stock, $\frac{1}{2}$ or $\frac{5}{8}$ by $1\frac{1}{2}$ inches; any old, heavy wagon tire will do. Cut to length of 7 inches. At a point, $2\frac{1}{2}$ inches from one end make a center punch mark and bend at center punch. In the short end punch a $\frac{1}{2}$ -inch hole in center. Now, on long part, just $1\frac{1}{2}$ inches from the corner, punch another $\frac{1}{2}$ -inch hole and in the end punch a $\frac{3}{8}$ -inch hole. Bolt this under the wooden leg, using the bolt on the machine and placing another bolt a little further down. Now knock the spring off the machine and get a $\frac{3}{8}$ -inch rod. Shape a hook on one end of it; slip it through the staple where the spring was, pass it through the iron you made and put

a fairly stout coil spring on the rod. There should be a long thread on the rod so that you can screw a nut on it. Now try the machine and see the fine work your shrinker will do. If it slips screw the spring tighter.

Material and Labor Cost Accounting

A. M. BURROUGHS.

Next to labor, the most important thing the shop-owner pays for is material. It is just as essential that you guard the raw material or finished parts in the stock room as that you guard the money in your safe.

C. E. Knoeppel says: "If a dollar in the office is guarded with the care that it is, a piece of brass in the stock room costing and worth a dollar, should receive the same degree of attention; and a workman should have no more right to take this piece of brass from stock without accounting for it, than he would have the right to walk into the office and remove a dollar from the cash drawer."

"Materials should not be given out indiscriminately under any circumstances. If the proper persons are held responsible, it will be found that the stock department will count for something in the accomplishment of maximum results, for it will be known what is in stock and the quantity; purchases can be made to advantage, overstocking will be prevented; workmen will find it a hard

this is added all charges in connection with handling it.

Therefore when the amount required to make a certain article is definitely known, it can be charged up at the same rate at which it was purchased, plus the expense of handling.

Raw material in any shop is the material as it is received before any change has been made in it.

Accessory material is that which does not go into the product itself, but is used in its manufacture. In this class fall such items as tool steel out of which certain tools are made, repair material, etc.

The market may fluctuate, it is true, but still the mean or average price of material is easy to determine.

The operations necessary in handling raw material are its purchase, storage, and subsequent distribution.

(Continued on Page 253.)

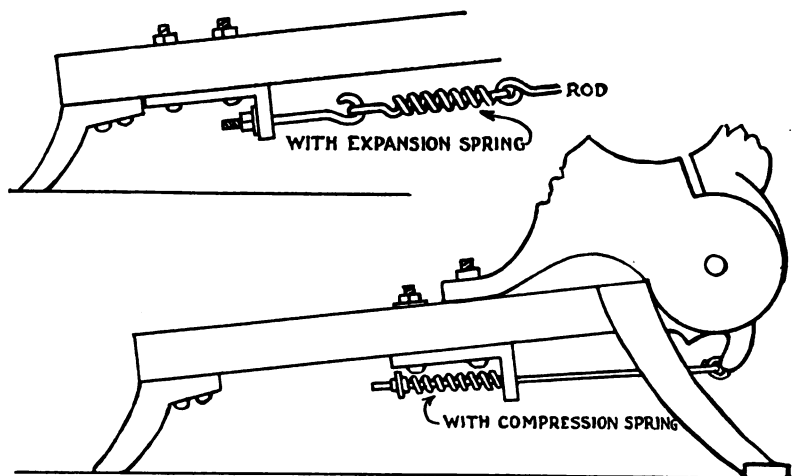
The Smith in The Daily News

Odd Mention of Anvil Ringers and Knights of the Forge in the News of the Day.

Elmer Myers—Baseball Phenom.

Muscles developed as a kid, pumping the bellows and massaging the anvil in his dad's blacksmith shop in York Springs, Adams county, Pennsylvania, are making Elmer Myers famous these days.

"Myers is the greatest young pitcher I have ever developed. Better than Plank, Bender or Coombs? Yes, sir! Myers does not know as much about pitching as these



USERS OF THIS TYPE OF TIRE SHRINKERS WILL BE INTERESTED IN MR. BUNDY'S STUNT

matter to remove material without authority to do so; mislaid and wasted materials can be traced to those responsible."

The cost of material is comparatively easy to obtain. The price paid for it depends on the market. To

old stars, but right today he is a better pitcher than any of them were in their prime."

That is Connie Mack's tribute to the graduate blacksmith.

Howard Haman—Strong Man.

One of the best known blacksmiths in Calais, Me., is Howard Haman, and he is



able to do more than the average run of men of his calling. He is 38 years of age, and is able to turn hand springs just as well as a trained acrobat. He weighs 160 pounds and is exceptionally well developed. He can lift from 1,200 to 1,400 pounds. His hands are so strong that it is an easy matter for him to break a No. 2 horse shoe apart, and bending four-inch wire spikes with his bare hands in an easy stunt for him. He is a good boxer and is a good performer on the horizontal bar.

Charles R. Vickery—Blacksmith-Preacher.

At Stamford, six miles southeast of Bennington, is a "preacher-blacksmith," a man who has solved the small church problem in at least several instances, who divides his time between the anvil and the pulpit, pounding iron four days in the week, expounding the gospel on one day and devoting the other two to pastoral duties and preparation for his Sunday work.

The man who is thus demonstrating the practicability of presiding over a small church without suffering the privation with which many country ministers are familiar, and without burdening the members of his flock unduly in the matter of support, is Rev. Charles L. Vickery. In Stamford village, as in all small communities, ministers' salaries are necessarily small, but through his skill as a mechanic and willingness to work hard in two such widely separated spheres as the blacksmith shop and the pulpit, Mr. Vickery has solved the problem, so far as that particular church is concerned.

His father and grandfather were blacksmiths and he practically grew up in a blacksmith shop. Possessing natural mechanical ability, he absorbed the trade without any formal apprenticeship and reached maturity prepared to take good care of himself at the forge.

Miss Lura A. Hawk—Student of Blacksmithing.

Iowa State College, located at Ames, Iowa, includes a course in blacksmithing in its curriculum and Miss Lura A. Hawk is one of the students of that blacksmithing class who is of the female sex. And just to show that she is interested in other things besides blacksmithing she won the faculty cup for the best extemporaneous address. Her subject was: "Why Women Should Propose."

Thoughts on Timely Topics

BY THORNTON

Canstic Censure and Cheery Comment

EDUCATION is one of the finest things that was ever invented, but—there are some fifty-seven varieties of education. For example—and don't take this as a knock on the colleges—there's the college education, which is all O. K. for the chaps who can afford it—but some can't. For example I know a chap who came out of college with the finest collection of loud clothes that it was ever my pleasure to blink my eyes at. Another fellow learned how to roll a cigarette with one hand, and still another learned of the futility of "sticking" unless you've got "openers". And so it goes. It would seem, at times, when thrown into contact with any considerable

number of the fresh young product of our seats of learning that pretty much every college is made of about one-half sport, one-fourth clothes, one-eighth extravagance and a part of the balance is learning. Of course, it depends in a measure on the kind of material the college has to work on. As old Hank Perkin's used to say: "Brain food may be all right, but y' got to have somethin' for it to work on."

Now take the blacksmith shop as a place of learning. Some young fellows I known didn't learn much more than a few good lessons in cussing during their apprentice days, while others got well started into the elements of how to torture that noble animal called the horse and still keep out of harm's way.

Of course, there are both college students and horseshoeing apprentices who learned something more than merely the rudiments of what they went after in the shape of real education and knowledge.

"WHAT SHOULD I DO?" asks one cold-footed smith after detailing his trials and tribulations in attempting to stop the local flood of public favor for the automobile. "If this keeps up I don't see how the horse and wagon and buggy can hang on much longer, and, of course, that means that yours truly, the humble smith must needs quit or starve at the anvil."

When you get to feeling sorry for yourself and to wishing you were in some other business, be sure you are getting the wrong slant at things. Move around to another viewpoint and get a look at the beauties of the job. It will do you good. This man has the wrong slant on his job. I'll wager a good cigar against a busted spark plug that he's trying to do business in the same old way as when he started. Seems queer to me that some smiths can't see any farther than their own anvil and bench when it comes to keeping up with progress. Of course, smithing is an important business. It is quite necessary to the farmer that there be a competent smith upon whom he can call for help when the need

arises. But—it isn't the most important business on earth by several miles and it is simple foolishness for a smith to kid himself along on the supposition that the smithing business is the only pebble on the beach, because a great big wave in the shape of the auto and tractor will put that little pebble out of business and send it high and dry upon the rocks.

But to resume, this smith is standing in his own light. He is arguing against progress and he'll get about as far along on the road to success as a one cylinder auto with an empty fuel tank. The auto and tractor have come to stay. The blacksmith is here and will stay—but he's got to adjust himself to modern progress and keep step with the advancement of the day. My advice to the smith deploring his fate, is to right about face and get busy on some modern stuff—and get busy right away. Get some of the auto and tractor atmosphere of progress and advancement into his soul and allow it to expand and grow.



Veterinary Notes for the Horseshoer

Contracted Heels

This is a common disease among horses, the term indicating a condition in which the posterior half of the foot is or becomes narrower from side to side. It is usually found in horses that are kept on hard dry floors and especially in

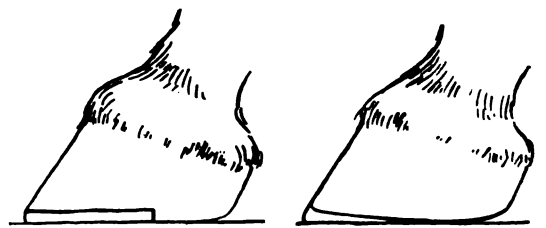
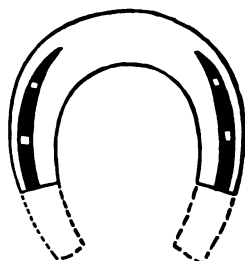


FIG. 1.—THE FOOT MAY BE SHOD WITH A TIP "LET IN" OR A THINNED TIP



horses that have flat feet with weak heels.

The condition is found nearly always in the front feet, the hind rarely being affected. Usually only one foot is affected at a time, but this is not always true and it may affect only one heel and when this is the case it is the inner one.

Certain breeds of horses, normally have feet which approach nearer the oval than the circular form or the feet may normally be narrow ones.

Causes.—The most common cause of contracted heels is the shoeing with high heel calks thereby removing all weight off the frog. When the foot is placed on the ground as nature intended it should be, the pressure on the frog causes an expansion of the heel. Contracted heels are not found in the horse that has never been shod unless it is caused by some other disease such as side bones, ring bones, thrush, canker, navicular disease, corns, sprains of the flexor tendon or from excessive knuckling of the fetlock joint.

The following are other common faults in shoeing, which will cause this condition, cutting away the frog, heels and bars, rasping the wall too close and the driving of the nails too near the heels:

Animals used to work in marshy districts, when put to work on hard dry streets and allowed to stand on dry floors very frequently become affected with this disease.

Symptoms.—If both feet are affected this disease will probably go unnoticed for a considerable length of time, but when one foot is affected the change will readily be noticed by comparing it with the other. If lameness is present in the suspected foot all doubt will be expelled.

In cases where the disease is advanced the ground surface of the foot is smaller than the coronary circumference, the frog is pinched between the heels and is much shrunken. The bars of the foot are nearly perpendicular, heels higher and the sole is more concave than normal. The hoof is hard, dry and is often ridged, the ridges following the direction of the horn fibers. The foot is very often affected with Thrush. When taking animal from the stable he usually is stiff, walks on his toes, but in a short time goes sound. Stumbling is common and the toe of the shoe is worn off rapidly, either when horse is at rest or at work. In old cases when the foot is pared there will be found a dry

mealy horn where wall and sole unite, extending toward the quarters in a narrow line.

Treatment.—The most successful treatment may be one of the following methods or a combination of two of them:

First.—By restoring the pressure from below to the frog.

Second.—By the use of an expansion shoe.

Third.—By operating upon the horn of the wall.

Fourth.—By the use of spring at the heels.

First.—By restoring the pressure from below to the frog.

(a) This may be accomplished by either of the following methods:

Shoeing with a Tip Shoe "let into" the foot.

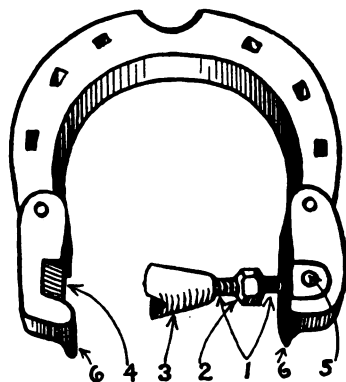


FIG. 2.—SMITH'S EXPANSION SHOE

1—Screw with fine thread; 2—Nut on screw; 3—Thimble engaging with slot at 4; 5—countersunk rivet; 6—The grip for the bars of the foot.

Shoeing with a Tip Shoe Thinned.

For shoeing with a Tip Shoe (see Engraving Fig. 1), the foot should be so pared as to allow the heels of the tip to sink flush with the bearing edge of the wall. If the foot will not allow this trimming, use the thinned tip.

(b) This may also be accomplished by the use of a Bar Shoe.

The wide bar on the shoe is to receive the frog and cause pressure on same causing the normal expansion and contraction of the hoof at the heels when animal steps on foot. If the frog is wasted away and does not press on the bar, a leather or rubber pad will have to be introduced to cause this pressure.

(c) The pressure to the frog may also be accomplished by turning the animal out to grass.

Contracted feet are frequently overcome by removing the shoe and turning the animal to pasture. This method takes quite a long time, usually five or six months.

Second.—By the use of an expansion shoe.

We cannot give all the expansion shoes, but the following are the most successful:

(a) Smith's Expansion Shoe, (Fig. 2), if the shoer will take the time to make it, will give the best and quickest results.

The inventor uses the shoe in the following way: "I screw it up very gradually until I see the cleft of the frog just beginning to open. I now trot the horse up and if he goes sound it is certain that the pressure I have exercised will not give rise to trouble. The animal is sent to work to assist in the expansion of the foot. In examining the shoe the next day, the grip is found to be quite loose, the foot has enlarged, and the nut is turned once more until the grip on the bars is tight-



FIG. 3.—THE BROUE SLIPPER SHOE

ened, the horse being again trotted to ascertain that no injurious pressure is exerted."

(b) Slipper Shoe of Broue. (Figure 3).

The bearing surface of this shoe is just the reverse of the common shoe. The slope is from the inside out, and the outside should be from 1½-inch to 1⅛-inch lower than the inside.

The animal's weight tends to make the walls of the foot at the heel slide outward and in this way spread the heels.

Third.—Operating on Horn of the Wall.

The horn of the wall should be rasp away at the quarters until just a thin layer of horn covers the soft tissues underneath. The horn should be thinned from heel forward, from two and a half to three inches.

After the quarters are thinned a good sharp blister should be applied to the coronet and the animal turned to pasture.

This treatment usually takes three months time to complete a cure.

4th.—Buy the use of a Spring at the heel.

A spring which can be purchased at any blacksmith supply house, is inserted between the shoe and the foot at the heel. Both ends of the spring being sharpened and fastened to the wall by these points, under the shoe. This spring will exert a constant outward pressure.

The toe of the hoof should be thinned by rasping, to allow the heels to spread more readily.



SINCE WE PLOW WITH GASOLINE

BY ORLO L. DOBSON.

HORSES NOW ARE GETTING LAZY
AND AS FAT AS THEY CAN BE.
IT IS FUN TO SIT AND WATCH THEM
AS THEY NICK AND SNORT WITH GLEE.
OLD MARES ACTING UP LIKE YEARLINGS.
SUCH A SIGHT IS SELDOM SEEN;
LIFE TO THEM IS SURE WORTH LIVING.
SINCE WE PLOW WITH GASOLINE.

TRACTORS READY IN THE MORNING.
IT IS THERE THE WHOLE LONG DAY.
IF YOU WISH TO PLOW BY MOONLIGHT
FILL YOUR TANK AND SAIL AWAY.
NEED NOT WORRY OVER HORSEFLESH.
WE CAN LAUGH AT DR. GREEN
WITH HIS SPRAIN CURE AND OINTMENT.
SINCE WE PLOW WITH GASOLINE.

BOYS NOW TAKE LIFE RATHER EASY.
NOT SO MANY CHORES TO DO;
ONLY HALF AS MANY HORSES
TO ATTEND THE WHOLE YEAR THROUGH.
NOT A SHOULDER GALL TO WORRY.
NOT SO MANY NAGS TO CLEAN.
THEY CAN SLEEP A LITTLE LONGER.
SINCE WE PLOW WITH GASOLINE.

WE CAN GET THE CROPS IN EARLY.
GIVE THEM TIME TO DO THEIR BEST.
IF WE DO OUR PART IN SEASON.
THE GOOD LORD WILL DO THE REST.
DROUGHT CAN'T CATCH THE OATS AND BARLEY.
WHILE THE CORN IN SHOCKS IS SEEN
ERE THE EARLY FROST OVERTAKES IT.
SINCE WE PLOW WITH GASOLINE.

THOUGH OLD SOL MAY DO HIS DARDEST,
HE CAN'T MAKE THE TRACTOR SWEAT.
HORSE FLIES STOP TO LOOK IT OVER,
BUT THEY DO NOT MAKE IT FRET.
DO NOT NEED TO WASTE TIME RESTING,
CAN NOT FINDER THAT MACHINE.
WE CAN TURN THE SOIL RIGHT LIVELY.
SINCE WE PLOW WITH GASOLINE.

WISH I HAD ANOTHER EIGHTY.
I COULD HANDLE IT WITH EASE.
RAISE MORE CORN AND WHEAT AND BARLEY.
ALSO MORE OF OATS AND PEAS.
NO EXCUSE FOR IDLE ACRES.
EVERY FIELD SHOULD NOW SMILE GREEN.
AMPLE TIME TO PLOW AND HARVEST.
SINCE WE PLOW WITH GASOLINE.

MY VETERINARY PRACTICE
POSSIBLE AT YOUR
CONVENIENCE
DR. GREEN

JOHN GREEN

From Farm Imp. News.

And remember while on the subject of cost accounting, that the job well done the first time costs less in the long run.

System does not always spell success, but system linked with personality and knowledge come pretty close to the goal.

Have you enough Pink Buffalo Stamps on hand? We will supply you free of charge. Make liberal use of them. Stamp yourself as a wide-awake smith.

It is not the customers you get that really count but the ones that you keep. Strict and careful attention to the keeping of customers will make the getting easier.

Do they know each other? We refer to over-head expense and selling price. Read the articles and get this matter of cost accounting straight in your mind and business.

When a man has energy and knowledge and mixes the right kind of effort with that energy and knowledge in any business it is very hard to make a failure, in fact, it is almost impossible.

If it were possible to operate upon some shop and cut out the unprofitable work—the unnecessary and absolutely non-essential jobs—there would be very little left and that little would have little life.

The successful blacksmith is the one who can and will make use of the experiences of others, for he has the courage to discard his own errors, and profit by the truths of other men in the business.

Backbone is needed in managing the business as well as in doing the actual work. It takes backbone to refuse creditors who do not deserve it, and it also requires backbone to collect from "dead beats."



Heats, Sparks, Welds

And again another Shop Number appears, let us know what you think of this issue.

It is a good idea to sell service with your services. Service is the magnet that draws trade into your shop.

Blacksmith wanted at Panama Canal. Men experienced with Bradley hammers and steam hammers and who can work to blue prints; wages 65 cents an hour; free transportation from New York or New Orleans; must be American citizens and under 45 years. For full information on the above write to Chief of Office, The Panama Canal, Washington, D. C.

Do you know that half the failures during good business periods occur because the bankrupts do not know their costs? If you do not know real costs in your business, how can you actually know anything about it?

What do you do?—Guess at profit or simply not care so long as you get your money? Some smiths think that their real purpose in business is to get the price that their competitor was going to charge or even a little less, irrespective of cost.

It won't take long to write up that peculiar job that you recently did in your shop. The Editor and all of "Our Folks" will be very much interested in reading about your hard job, your difficult job and your out-of-the-ordinary one. Why not do it now?

No opportunities, did you say? Perhaps you are not ready to grasp them. Ever think of it in just that way? The player who brings in the most runs is the fellow who is "there with the right swing" when the ball comes right for him; but he has got to see it when it comes.

How does the appearance of your shop effect your business? Does it increase or decrease your opportunities? Think about this, it is important. Look at your shop from a stranger's view point and when you've done that, do the same with yourself and act accordingly.

A Big Day's Work is reported by S. H. Creeden of New York, who says: "In one day I drew the shoes on ten horses and put on nineteen sets, beginning at eight o'clock and quitting at five; twenty-nine horses in one day. In six days I shod 105 horses—pulling and drawing every shoe without help.

Some smiths need to extend credit. In fact, it is necessary for them to do business that way, if they are to do any business at all, but they do not need to extend credit in an unbusiness-like manner. There is no excuse for extending credit to a customer whose record is poor. Do business on a business basis.

Do you know that the standard of price in the blacksmithing craft is continually going up? A year or two ago the ideal price permitting a fair percentage of profit and over-head was placed at \$2.00. Now horseshoers in many sections of the country are setting \$2.25 and \$2.50 as the proper mark. What are you doing?

No one man can know all there is to know about blacksmithing. It is only by getting together, by exchanging ideas and by telling of our own experience that we can broaden and enlarge our knowledge of the craft. We can do this through the pages of THE AMERICAN BLACKSMITH and that is the real reason for papers of this kind.

Cost finding systems are fine but when it costs more to find out what a job costs, than it costs to actually do the job, it is time to call a halt. But it is also possible to go to the other extreme. A safe middle course—a little cost accounting and a little common sense thoroughly mixed will make a combination that is hard to beat.

One man we know would sooner pay two dollars for a little bottle of some faker's so-called magic welding and plating powder, than he would pay one dollar for twelve issues of a trade paper which will tell him more about welding and plating and one hundred other things that the money-grasping faker ever knew or thought of knowing and that man's name is neither Dick nor Harry, but his initials are T. T.



Our Honor Roll

AND STILL THEY COME

More and more readers are taking advantage of "Our Honor Roll" every month and it is becoming more difficult each month to find a place on the list of Honor Subscribers. If you do not know what a saving you can make by taking advantage of Our Long-Time Rates look over the table of rates and see just how can save money and at the same time insure your subscription account. Sharpen your pencil and get down to actual figures and then get your name on this list of Readers who are paid up well in advance.

	U. S. and Mexico	Canada	Other Countries.
2 yrs.	\$1.60 save \$.40	\$2.00 save \$.50	10 sh. save 2 sh.
3 yrs.	2.00 save 1.00	2.70 save 1.05	14 sh. save 4 sh.
4 yrs.	2.50 save 1.50	3.20 save 1.80	18 sh. save 6 sh.
5 yrs.	3.00 save 2.00	3.75 save 2.50	1 £ save 10 sh.
10 yrs.	5.00 save 5.00	7.00 save 5.50	1 £ 14 sh. save 1 £ 6 sh.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no better time than NOW.

NAME	Subscription Paid to	NAME	Subscription Paid to
The Fix-It Shop, Utah.....	July, 1935	W. B. Briant, N. J.....	Mar., 1924
J. A. Torrey, Mass.....	Dec., 1933	A. Bosch, N. Y.....	Mar., 1924
W. C. Watt, Kansas.....	Dec., 1930	A. R. Johnson, R. I.....	Feb., 1924
I. J. Stiles, N. Y.....	Jan., 1929	F. Jacobs, Ohio.....	Feb., 1924
Waddington Farm, W. Va.....	Mar., 1928	A. J. Ferry, Illinois.....	Jan., 1924
A. A. MacLean, Nev.....	Feb., 1927	E. G. Walker, Calif.....	Jan., 1924
Plateau Shoeing Shop, Colo.....	Dec., 1926	H. D. Erskine, Vermont.....	Jan., 1924
John H. W. Schneider, Cal.....	Dec., 1926	E. Fowler, Pa.....	Jan., 1924
J. Taylor, Calif.....	Oct., 1926	Breen & Son, Ireland.....	Dec., 1923
P. Sowa, Oregon.....	May, 1926	M. Lamoreaux, Ohio.....	Dec., 1923
G. F. Bowers, Ohio.....	Apr., 1926	C. R. Davis, N. Y.....	Dec., 1923
W. Pochelu, Oregon.....	Mar., 1926	F. W. Copeland, Kansas.....	Dec., 1923
A. Garver, Ohio.....	Feb., 1926	J. L. Tomlin, Kansas.....	Dec., 1923
F. Kearnes, Illinois.....	Jan., 1926	H. A. Davis, N. Y.....	Dec., 1923
J. N. McIntire, Pa.....	Jan., 1926	E. H. Troyke, Illinois.....	Dec., 1923
W. Post, N. Y.....	Jan., 1926	D. B. Johnson, Iowa.....	Dec., 1923
Powell Brothers & Whitaker, Eng- land.....	Jan., 1926	S. Horton, Calif.....	Nov., 1923
O. Temple, Idaho.....	Jan., 1926	J. Spratt, Mass.....	Nov., 1923
N. Karolewicz, S. Dak.....	Jan., 1926	F. Watkins, N. H.....	Nov., 1923
E. L. Lahn, N. Y.....	Dec., 1925	F. Koppins, Ala.....	Nov., 1923
J. A. Hulvey, Illinois.....	Dec., 1925	Y. C. Lienert, S. Australia.....	Oct., 1923
Williams & Turner, W. Va.....	Dec., 1925	W. B. Abell, N. Y.....	Oct., 1923
J. J. Devine, N. J.....	Dec., 1925	W. R. Turner, Man.....	Oct., 1923
P. Nelson, Minn.....	Dec., 1925	C. Nelson, Nebr.....	Sept., 1923
M. Kennedy, Tas. Australia.....	Dec., 1925	H. M. Anderfuren, Calif.....	Aug., 1923
A. J. Wasmuth, Idaho.....	Nov., 1925	Camp Brothers, Texas.....	Aug., 1923
J. G. H. Mallett, Queens, Australia	Nov., 1925	L. C. Larson, Iowa.....	July, 1923
A. W. Speir, Ohio.....	Nov., 1925	S. Eftenaar, South Africa.....	July, 1923
W. R. Clepper, Texas.....	Nov., 1925	G. L. DeWitt, Mont.....	July, 1923
G. H. Isley, Mass.....	Nov., 1925	W. W. Gregg, Texas.....	July, 1923
Reynolds Brothers, Pa.....	Sept., 1925	W. R. Stroupe, N. C.....	July, 1923
F. W. Krenz, Calif.....	Aug., 1925	O. C. Young, Michigan.....	June, 1923
C. E. Allen, Nebr.....	Aug., 1925	Otto Sippel, Pa.....	June, 1923
A. E. Spangberg, Oregon.....	May, 1925	A. Chapman, N. Y.....	June, 1923
D. M. Klie, Okla.....	Apr., 1925	C. Birely, Md.....	June, 1923
G. Gullgren, Iowa.....	Apr., 1925	F. H. Shupe, Pa.....	June, 1923
G. Frericks, Minn.....	Mar., 1925	J. C. Stover, Pa.....	Apr., 1923
V. Pressnitz, Wisc.....	Mar., 1925	W. Schoonover, Pa.....	Apr., 1923
E. Price, Illinois.....	Feb., 1925	J. M. Rumire, Iowa.....	May, 1923
D. C. Garber, Ohio.....	Feb., 1925	Lowndale Brothers, Mo.....	Mar., 1923
J. H. Kurt, Illinois.....	Feb., 1925	J. Carswell, Ark.....	Mar., 1923
E. R. Hiteshu, Ohio.....	Feb., 1925	G. E. Glazier, Ohio.....	Mar., 1923
H. F. Schreiber, Pa.....	Feb., 1925	G. Fath & Co., S. Africa.....	Mar., 1923
C. M. Adams, Conn.....	Jan., 1925	T. Bradley, N. S. Wales.....	Mar., 1923
J. S. Damm, Iowa.....	Jan., 1925	L. T. Needham, Illinois.....	Feb., 1923
J. M. Withers, Hawaii.....	Jan., 1925	G. C. Dinsinger, Miss.....	Feb., 1923
F. H. Jarvis, Indiana.....	Dec., 1924	J. Hughes, Ohio.....	Feb., 1923
George Tatum, Jr., Fla.....	Dec., 1924	J. Wieber, Minn.....	Jan., 1923
I. Clark, Va.....	Dec., 1924	Z. A. Enos, Minn.....	Jan., 1923
A. N. Estes, Va.....	Dec., 1924	W. G. Wise, Calif.....	Jan., 1923
J. Bailey, Manitoba.....	Dec., 1924	F. S. Bishop, South Africa.....	Jan., 1923
E. G. Naylor, Md.....	Dec., 1924	J. Curran, Arizona.....	Jan., 1923
Halvorson Brothers, S. D.....	Nov., 1924	S. P. Harney, Mont.....	Dec., 1922
P. Schicks, Washington.....	Nov., 1924	W. Breckner, Okla.....	Dec., 1922
H. E. Snyder, Oregon.....	Nov., 1924	J. Pabina, Nebr.....	Dec., 1922
J. A. Stewart, Ky.....	Oct., 1924	P. Fredericksen, Iowa.....	Nov., 1922
C. Riehecker, N. Y.....	Oct., 1924	L. O. Leirus, Illinois.....	Nov., 1922
W. L. Bertholf, N. J.....	Oct., 1924	W. Lawson, New Zealand.....	Nov., 1922
W. L. Hewson, S. Africa.....	Sept., 1924	W. O. Grant, Calif.....	Oct., 1922
Ed. Larson, N. D.....	Sept., 1924	W. H. Miller, Iowa.....	Oct., 1922
R. T. Monk, Illinois.....	Sept., 1924	A. O. Martin, Idaho.....	Sept., 1922
W. T. De Young, Illinois.....	Sept., 1924	O. A. Mortimer, Idaho.....	Sept., 1922
C. W. Taylor, Pa.....	Aug., 1924	H. J. Hyatt, Washington.....	Sept., 1922
Charles Wells, Colorado.....	Aug., 1924	J. N. Skow, Iowa.....	Sept., 1922
H. G. Weaver, Pa.....	Aug., 1924	A. D. Standiford, Washington.....	Sept., 1922
Working Men's College, Vict.....	June, 1924	T. Temkiewicz, Quebec.....	Sept., 1922
W. M. Kenoyer, Nebr.....	June, 1924	A. Pelifier, Ohio.....	Aug., 1922
C. C. Frederick, N. D.....	May, 1924	W. D. Valentine, Iowa.....	Aug., 1922
J. L. Fenton, New Mexico.....	May, 1924	G. Hoffman, N. Y.....	July, 1922
J. Carl, Iowa.....	May, 1924	J. Erman, Ark.....	July, 1922
J. E. Little, Pa.....	May, 1924	W. K. W. Hansen, Pa.....	June, 1922
H. I. Brenzle, N. Y.....	Apr., 1924	Robert Tochter, Calif.....	June, 1922
W. E. Parr, Iowa.....	Apr., 1924	F. Van Marter, N. Y.....	June, 1922
F. Bramek, Nebr.....	Apr., 1924	J. Norrie, Yukon Ty.....	Jan., 1922
L. A. Hulen, Calif.....	Apr., 1924	E. Anders & Son, S. Australia.....	May, 1922
J. E. Ray, Minn.....	Mar., 1924	Louisa Carriage Works, Va.....	May, 1922
A. Hulstrand, N. D.....	Mar., 1924	S. Smith, Texas.....	Apr., 1922
W. F. Riske, Wisc.....	Mar., 1924	J. W. Haar, La.....	Mar., 1922
E. F. Seibert, Calif.....	Mar., 1924	D. W. Smith, La.....	Mar., 1922
H. Roschewetter, Mo.....	Mar., 1924	D. W. Smith, Rhode Island.....	Mar., 1922
		E. A. Dillon, Nev.....	Mar., 1922
		D. F. Kuster, Washington.....	Mar., 1922

NAME	Subscription Paid to	NAME	Subscription Paid to
G. F. Johnson, Michigan.....	Feb., 1922	J. Hiernenz, Minn.....	Mar., 1920
R. H. Keith, Iowa.....	Jan., 1922	G. S. Akers, Va.....	Mar., 1920
F. H. Joslin, Mass.....	Dec., 1921	F. White, N. Y.....	Feb., 1920
J. B. Scheidler, Indiana.....	Dec., 1921	J. H. Wildey, Penna.....	Feb., 1920
J. H. Ickes, Pa.....	Dec., 1921	W. Nasgowitz, Wisc.....	Feb., 1920
E. Willis, Colorado.....	Dec., 1921	J. F. Leiss, N. J.....	Feb., 1920
J. Delane, Nebr.....	Nov., 1921	C. M. Jacobsen, Utah.....	Feb., 1920
O. M. Johnson, Miss.....	Oct., 1921	I. Blough, Penna.....	Feb., 1920
H. Feldus, Nebr.....	Sept., 1921	J. B. Windle, Iowa.....	Jan., 1920
A. S. Pratt, New York.....	July, 1921	J. E. Erickson, Minn.....	Jan., 1920
A. J. Hatch, Maine.....	May, 1921	A. Fisher, W. Va.....	Jan., 1920
W. Cornwell, Pa.....	May, 1921	I. J. Giguere, N. H.....	Jan., 1920
W. F. Kline, Kansas.....	May, 1921	E. Gunther, Iowa.....	Jan., 1920
A. Johnston, N. D.....	Apr., 1921	L. H. Willson, Vermont.....	Jan., 1920
D. H. Laird, N. Y.....	Apr., 1921	D. R. White, Kansas.....	Jan., 1920
A. J. Prue, N. Y.....	Apr., 1921	P. Bianchi, Texas.....	Jan., 1920
C. A. Butler, Ohio.....	Apr., 1921	R. S. Crisler, Ky.....	Jan., 1920
E. Mossner, Queens, Australia.....	Apr., 1921	T. A. Mahar, Me.....	Jan., 1920
William Pate, Mo.....	Mar., 1921	T. Horne, Ariz.....	Jan., 1920
A. T. Jameson, Colorado.....	Mar., 1921	H. B. Draper, Ind.....	Jan., 1920
C. Alexander, N. Y.....	Mar., 1921	H. H. Schoob, Wyo.....	Jan., 1920
J. Pencil, Wisc.....	Mar., 1921	L. A. Coats, Mont.....	Jan., 1920
H. Cornils, Oregon.....	Mar., 1921	H. Kraft, Calif.....	Dec., 1919
C. Schmid, Nebr.....	Mar., 1921	S. Barber, Iowa.....	Dec., 1919
J. Schwarzmann, D. C.....	Mar., 1921	M. Martin, S. D.....	Dec., 1919
N. F. Hartsoe, Mo.....	Feb., 1921	R. I. Ryberg, Iowa.....	Dec., 1919
I. Koepke, N. Y.....	Feb., 1921	Davable & Sons, Vict.....	Dec., 1919
R. E. Worthington, N. Y.....	Feb., 1921	E. M. Crouch, Conn.....	Dec., 1919
B. E. Doggett, Kansas.....	Feb., 1921	R. Werk, Nebr.....	Dec., 1919
J. Toes, Kansas.....	Feb., 1921	J. R. Wilson, Md.....	Dec., 1919
Shelhaas & Fry, Colorado.....	Feb., 1921	N. Buchanan, Ont.....	Dec., 1919
J. W. Wilson, Mo.....	Feb., 1921	P. Relf, Ohio.....	Dec., 1919
W. T. Wilson, Indiana.....	Feb., 1921	A. Larson, Ida.....	Dec., 1919
J. Schmid, Nebr.....	Feb., 1921	H. Andersen, Iowa.....	Dec., 1919
E. Slee, New York.....	Feb., 1921	I. F. Powers, N. J.....	Dec., 1919
A. R. Skerritt, New York.....	Feb., 1921	J. G. Grandlund, Conn.....	Dec., 1919
C. L. McNall, Mo.....	Jan., 1921	J. B. Horn, N. Mexico.....	Dec., 1919
A. Turley, Kansas.....	Jan., 1921	A. J. Haun, Calif.....	Dec., 1919
A. Seldel, Nebr.....	Jan., 1921	A. Clark, Vict.....	Dec., 1919
W. Ruple, Pa.....	Jan., 1921	O. J. Wilson, N. H.....	Dec., 1919
N. A. Englund, Iowa.....	Jan., 1921	Booth, MacDonald & Co., N. J.....	Dec., 1919
O. Gerhardtstein, Ohio.....	Jan., 1921	A. Luke, Nebr.....	Dec., 1919
W. C. Rutter, Illinois.....	Jan., 1921	J. W. Rupp, Wisc.....	Dec., 1919
J. L. Jester, Mo.....	Jan., 1921	F. G. King, N. Y.....	Dec., 1919
G. A. Moffatt, Yukon Ty.....	Jan., 1921	J. R. Walker, Indiana.....	Nov., 1919
O. A. Huff, Pa.....	Dec., 1920	C. A. Smith, Penna.....	Nov., 1919
J. T. Rowe, Iowa.....	Dec., 1920	J. B. Beaudet, Quebec.....	Nov., 1919
W. Parsons, Ontario.....	Dec., 1920	W. Vallance, N. Y.....	Nov., 1919
Eissler Brothers, S. Dak.....	Dec., 1920	W. Schaid, Wisc.....	Nov., 1919
J. Krabulec, Illinois.....	Dec., 1920	J. Delane, Nebr.....	Nov., 1919
L. F. Keilholz, Pa.....	Dec., 1920	F. Gudmundson, S. Dakota.....	Nov., 1919
F. Margraf, Minn.....	Dec., 1920	R. Ramach, N. W. Ter.....	Nov., 1919
S. Wright, New York.....	Dec., 1920	J. Naimith, N. Zealand.....	Nov., 1919
T. P. Conoadine, Mass.....	Dec., 1920	W. H. Lick, Ohio.....	Nov., 1919
J. D. Fox, Nebr.....	Dec., 1920	J. A. McGregor, Teen.....	Oct., 1919
W. Trener, Washington.....	Dec., 1920	P. J. Toomey, N. Y.....	Oct., 1919
A. G. Palmquist, Minn.....	Dec., 1920	W. N. Sheffield, Mo.....	Oct., 1919
J. E. Richards, Pa.....	Dec., 1920	T. M. Blackman, Pa.....	Sept., 1919
D. Codere, Illinois.....	Nov., 1920	J. Kirsten, South Africa.....	Sept., 1919
C. Fransen, New York.....	Nov., 1920	C. H. Winslow, California.....	Aug., 1919
J. Delane, Nebr.....	Nov., 1920	L. C. Withaup, Mo.....	July, 1919
J. H. Stattee, Mo.....	Nov., 1920	P. A. Stohl, Nebr.....	July, 1919
George F. Wardle, S. D.....	Nov., 1920	A. Coddling, Kansas.....	June, 1919
H. C. Strine, Pa.....	Nov., 1920	J. Sisk, Ky.....	June, 1919
C. M. McNutt, Mass.....	Nov., 1920	C. A. Whittemore, N. Y.....	June, 1919
J. M. Mapes, New York.....	Nov., 1920	P. Iverson, Conn.....	May, 1919
W. Condon, New York.....	Nov., 1920	A. Donahue, N. Y.....	May, 1919
F. Strief, Wisc.....	Nov., 1920	John Freel, N. Y.....	May, 1919
L. P. Mortensen, Michigan.....	Nov., 1920	P. Rogan, N. Y.....	May, 1919
W. Brenneeman, Indiana.....	Nov., 1920	R. L. Johanson, N. Y.....	May, 1919
McFarlane & Pratt, S. Africa.....	Oct., 1920	T. H. Billings, N. Y.....	May, 1919
Thomas Scurr, New Zealand.....	Oct., 1920	A. W. Phillip, N. Y.....	May, 1919
W. H. Finlay, New Zealand.....	Oct., 1920	J. Higginbottom, Iowa.....	May, 1919
J. Jordan, Cal.....	Sept., 1920	J. Varner, Iowa.....	May, 1919
J. Jordan, Calif.....	Sept., 1920	H. Cadwalder, Colorado.....	May, 1919
L. O. Breke, Washington.....	Sept., 1920	G. F. Warner, N. Y.....	Apr., 1919
R. D. Skimins, Penna.....	Sept., 1920	D. F. Paqueti, N. Y.....	Apr., 1919
L. R. Garvin, Ohio.....	Sept., 1920	C. E. Meader, S. D.....	Apr., 1919
A. E. Reeve, Mass.....	Sept., 1920	C. M. Woodson, S. D.....	Apr., 1919
G. W. Phillips, Utah.....	Aug., 1920	D. D. Grant, Mass.....	Apr., 1919
T. Chittenden, New Zealand.....	July, 1920	F. W. Heldenwald, Illinois.....	Apr., 1919
O. Smith, Pa.....	July, 1920	C. Raucher, N. Y.....	Apr., 1919
F. A. Poole, South Africa.....	July, 1920	E. Penneck, N. Y.....	Apr., 1919
C. Gibson, Ill.....	July, 1920	H. Hilderbrant, N. Y.....	Apr., 1919
H. M. Whitman, Neb.....	July, 1920	F. Hall, N. Y.....	Apr., 1919
The Goldfield Diamond Drilling Co., Victoria, Australia.....	July, 1920	G. T. McIntosh, N. Y.....	Apr., 1919
G. M. Robben, Kans.....	July, 1920	J. L. Hienman, Tenn.....	Apr., 1919
R. J. J. Rees, S. Australia.....	July, 1920	McCormick Brother, Kansas.....	Apr., 1919
L. Underhill, California.....	June, 1920	H. F. King, Indiana.....	Apr., 1919
F. Feitz, Ohio.....	June, 1920	Grantham Brother, N. D.....	Apr., 1919
W. M. Puryear, Ala.....	June, 1920	H. J. Hart, Queensland, Aust.....	Apr., 1919
W. L. Patterson, Okla.....	June, 1920	D. L. Williams, New York.....	Apr., 1919
D. Hardy, Vict.....	June, 1920	C. Daly, N. Y.....	Apr., 1919
E. Malpas, S. Australia.....	June, 1920	James Devoe, N. Y.....	Apr., 1919
A. J. Hamburg, Ohio.....	June, 1920	O. Williams, N. Y.....	Apr., 1919
C. M. Holton, Okla.....	June, 1920	T. Williams, N. Y.....	Apr., 1919
C. L. Graf, Ohio.....	June, 1920	W. C. Woodford, N. Y.....	Apr., 1919
A. Mellum, N. D.....	June, 1920	L. Chrysler, N. Y.....	Apr., 1919
J. A. Schmitz, N. D.....	May, 1920	F. M. Habard, N. Y.....	Apr., 1919
P. Wright, Calif.....	May, 1920	E. J. Chittenden, N. Y.....	Apr., 1919
F. Greer, Queens.....	May, 1920	W. Hinde, New Mexico.....	Apr., 1919
C. L. Morman, N. Y.....	Apr., 1920	Carpenter Brother, Oklahoma.....	Apr., 1919
A. Stephens, Queensland, Aust.....	Apr., 1920	G. E. Glatt, Pa.....	Apr., 1919
Alex. Zimmer, Ont.....	Apr., 1920	L. Bentley, N. Y.....	Apr., 1919
J. Weber, N. Y.....	Mar., 1920	A. D. Smith, N. Y.....	Apr., 1919
Clark Bros., Cal.....	Mar., 1920	J. Schultz, N. Y.....	Apr., 1919
W. H. Leonard, Penn.....	Mar., 1920	G. Edelmann, N. Y.....	Apr., 1919
Ed. Grimm, Tex.....	Mar., 1920	T. Wakeman, Sask, Canada.....	Mar., 1919
H. L. Place, S. Australia.....	Mar., 1920	J. Brightman, N. Y.....	Jan., 1919
		S. Bell, Indiana.....	Jan., 1919
		W. M. Humphrey, Ky.....	Feb., 1919



The Horseshoer

A Collection of Special Shoes for Special Purposes

PROF. C. H. MESLER.

(Continued from June)

73.—Front Hinge Shoe for contracted feet. Made with a screw in the heel to open out each day.

74.—Hind Shoe, side weight with toe calk.

75.—Front Shoe, heel side weight, rolling toe on inside, heel calk and toe calk on outside for kneeknocker with sore tendon.

76.—Hind Shoe, sideweight rolled on inside at heel, for heel interferer.

77.—Front Shoe, center bar frog pressure for sore footed horse.

78.—Hind Rocking Shoe for stiff coronary joint.

79.—Front Shoe, toe and calks for horse that rocks over on the outside. This gives him a brace for support.

80.—Front Shoe with heel calk and square toe on outside for horse that travels close at heels.

81.—Hind Shoe with notch toe and heel calk for forging horse.

82.—Front Shoe, rolling center motion.

83.—Hind Shoe, square toe, for forging horse that chops toe off square.

84.—Front Shoe with heel side weight, rolled on inside, with piece beyond the shell on the outside for true setting.

85.—Hind Shoe with three calks where horse wears out his shoe on the outside and interferes at toe.

86.—Front Plain Shoe rolled on inside for road work that interferes at toe.

87.—Front Shoe toe weight, heel and side calk at toe for draft work on horse that knocks ankle.

88.—Hind Shoe with side hook for cross firing. Can widen the ground surface at any angle to break habit.

90.—Hind Shoe, side weight, with rolling motion, heel calk on outside, used in general interfering from any cause.

91.—Front Shoe, light weight in the toe and outside for low shell on outside.

92.—Hind Shoe inside double the thickness on outside for chronic ankle hitter.

93.—Front Shoe with Center Bar and Cross Bar at point of frog. For flat foot use oakum and tar.

94.—Front Shoe, Square Toe with Side Weight rolled on inside at toe and notched for track work.

95.—Hind Shoe, Light Toe and Side Weight with Calk and toe for road work.

96.—Hind Shoe forged with solid toe for track work.

97.—Front Toe Weight Shoe with grab for track work.

98.—Hind Shoe Side Weight on inside, Calk on outside to balance roadster.

99.—Front Shoe: Rocking Shoe for horse with navicular joints grown together.

100.—Hind Shoe with square toe and straight on inside for interfering with side of foot, square toe study the action of foot on ground.

101.—Front Shoe with Feather Edge for interferes.

102.—Front Toe Weight: Square Toe and Rolled on inside for shin hitter and is to give more action.

103.—Hind Shoe, Side Weight with heel calks for buggy horse that wears out shoe on the outside.

104.—Hind Shoe for Toe Dragging.

105.—Front Shoe with Heel Calk and Toe.

106.—Front Shoe Swell Heel for Buggy work on, horse that is sore in tendon.

107.—Hind Shoe, brace on outside of toe for chronic cutter with his toe, and big ankle from cutting.

108.—Front Shoe with $\frac{3}{4}$ pad bar, toe and calks for horse that is sore in his quarters.

109.—Hind Shoe with piece on outside for horse that interferes with the side of his foot.

110.—Front Shoe Side Weight with heel and square toe calk for heavy draft work horse that interferes.

111.—Hind Shoe, Side weight, heel calk and toe for driving horse.

112.—Front Shoe, Heel Weight for buggy work to widen out action in front.

113.—Front Shoe, Heel weight and toe grab forged.

114.—Hind Shoe Side weight Notch for track work.

115.—Hind Shoe, Light with Heel Calk and Toe Piece on outside to steady action on pacer.

116.—Front Shoe with heel and toe calk for chronic stumbler when toe and calk are used on paved street.

117.—Front Shoe half bar toe and calk for road work with corn on inside.

118.—Front Shoe with outside beyond the hoof.

119.—Hind Shoe for cross-firing with hook from the toe.

120.—Front Shoe, Heel weight and rolling on inside, with a stay in front for horse that travels to wide.

121.—Front Shoe Bar of quicken action.

122.—Hind Shoe for Brass weight on race track.

123.—Hind Shoe, Side weight with toe and heel calks on outside, rolling motion on in side at toe, for toe interfering.

125.—Front Shoe, Hinge on both sides for narrow heel natural spreader.

126.—Hind Shoe, Diamond Shaped toe for badly forging horse.

127.—Front Shoe, heel weight convex to widen out action in front and prevent picking up dirt.

128.—Hind Shoe for Pacing Horse.

129.—Front Shoe, rolled on inside, heel calk on outside with a piece on outside of toe for chronic shin cutter.

130.—Hind Shoe for Road Horse that interferes in a slow trot.

131.—Front Shoe, side weight when toe and calks are required on horse that interferes with side of foot.

132 and 133.—Front Shoe with frog and center bar for flat feet.

134.—Hind Shoe, Toe weight for horse with long step.

135.—Hind Shoe with rim on the inside for free hitter.

136.—Front Shoe with toe grab for track work.

137.—Hind Shoe for track work when horse wheels out. The brace keeps limb in line.

138.—Front Shoe, Plain side weight for horse that interferes with toe.

139.—Front Shoe, Toe Calks for horse that interferes with toe when calks are required on paved streets.

140.—Front Shoe, Pad bar for full frog pressure for narrow heel feet.

141.—Hind Shoe for same use; to be used as above.

142.—Front Shoe, full rolling motion to give action; good for forging or stumbling horse.

143.—Hind Shoe, Side weight on both sides; half round in the toe for forging.

144.—Front Shoe, hinge, when toe and calks are used on narrow heeled horses.

145.—Front Shoes and side weight and side calks.

146.—Front Shoe, heel weight and convex in front to widen action on buggy horse that cuts his quarters.

147.—Front Bar Shoe with side calks and toe for chronic founder.

148.—Front Shoe, weight in the quarters, with square toe for horse that cuts his quarters under the saddle.

149.—Front, Toe Weight and center weight to balance up quick gaited horses. It is a good shoe and will do good service if properly fitted.

150.—Front Shoe with double cross bar to roll foot in on horse that toes out.

151.—Rimming Plate.

152.—Front Shoe, Spring Toe for horse with narrow and cramped feet.

153.—Hind Shoe, rim on outside with rolling motion on inside for horse with low and weak shell on outside.

154.—Front Shoe, Square Toe, side weight, swell heel on inside to raised quarter.

155.—Front Shoe, heel weight, rolling motion for forging horse that forges on the edge of his shoe.

156.—Front Shoe, heel weight, rolling motion for forging horse that forges no the edges of his shoes.

157.—Mule Shoe for hocking mule.

158.—Front Shoe with heel and side calk on outside toe.

159.—OX SHOE.

160.—Front Bar Shoe, rolling motion square toe and heel calk for narrow heel stumbler or sore tendon.

161.—Hind Shoe bar for racing work.

162.—Stifel Shoe: With this shoe the animal stands on four feet instead of three feet, and is in an erect position.

163.—Toe Clip for narrow heel and corns.

164.—Sandal shoe, toe clip and center bar and pad, and good for horse with contracted sore quarters and corns.

165.—Hind Shoe with straight bar and heel calk for track work.

166.—Front Shoe, side weight, convex toe and inside half round for interfering with horse in travel

167.—Hind Shoe, toe and calk for horse that interferes at the toe, toe nails on inside of toe.

168.—Front Shoe for calks for ring bone, curb and spavin.

169.—Hind Shoe, heel calks and side calk outside for cross firing.

170.—Hind Shoe with heel calk, toe calk on inside toe for cross fire.

171.—Front Shoe bar and centre cocker for sprained fetlock.

172.—Front Shoe with outside calk, square on inside toe for horse that



reaches high and cuts knee.

173.—Hind Shoe, toe weight end heel calks to balance up hopler.

174.—Hind Shoe, Rim on inside for chronic interferer.

175.—Front Shoe: Roadster convex.

176.—Front $\frac{3}{4}$ Shoe, with pad, frog pressure for sore quarters.

177.—Hind shoe for dragging horse.

178.—Front Shoe for horse that's sore in the toe; take off the bearing at toe.

179.—Front Shoe, hinge in the middle with half bar for corns and contraction.

180.—Hind Shoe with side square and toe and rim for scalper horse.

181.—Front Shoe with center frog bar for soft corn on inside quarter.

leg for cut tendon or cock fetlock.

192.—Front Shoe with brace in front, with leather for treating cock fetlock.

193.—Hind Shoe, with heel calk and toe calk on outside, beyond the hoof for horse that toe is out.

194.—For toe dragging.

195.—Hind Shoe with heel calk and side calk on outside for scalper.

196.—Front Shoe, Bar Shoe with rim on inside for knee knocking.

197.—Hind Shoe with square toe on outside corner and round on inside for cross firing.

198.—OX SHOE.

199.—Front Shoe toe and calks for split hoof in front-crack to edge of hair.

crack.

211.—Front Shoe bar, side heel calks for chronic founder

212.—Front Shoe, rolling motion and bar for sore in the frog.

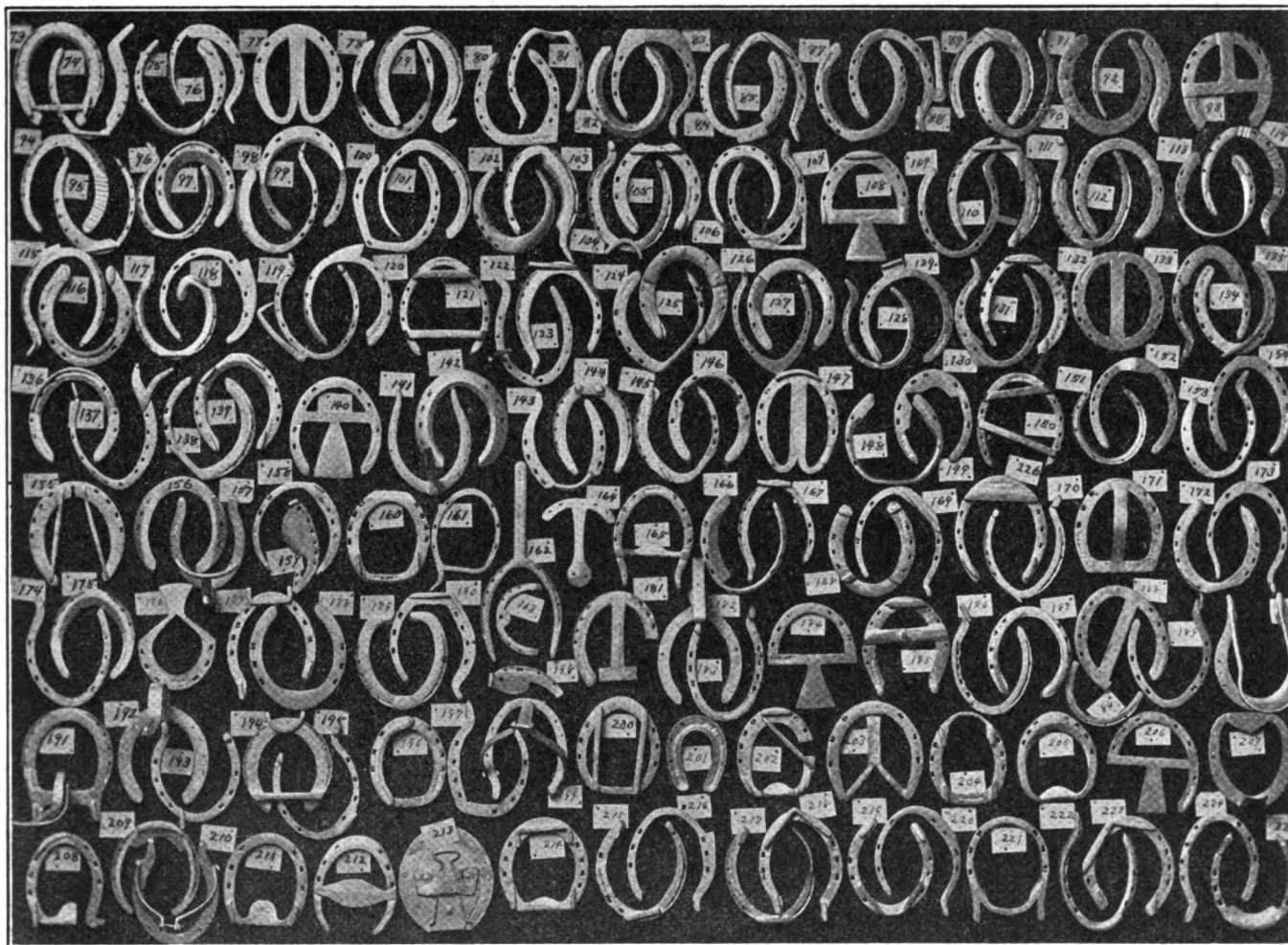
213.—Front Shoe with Spring for contraction, use Tar Oakum and Leather.

214.—Front Shoe, Bar with square toe calk and side heel calks to study action on roadster.

215.—Front Shoe, Heel and toe calk with side calk on outside for horse that interferes with side of foot.

216.—Hind Shoe with side wing on outside for interferer at side of foot.

217.—Front Shoe, Feather Edge and Calk for interferer.



MORE SPECIAL SHOES BY PROF. C. H. MESLER. HE TELLS BRIEFLY OF THEIR USE AND CONSTRUCTION

182.—Front Shoe for horse that walks upon toe and stiff in back tendon.

183.—Hind Shoe with heel calk and long toe calk for steadying action.

184.—Front $\frac{3}{4}$ Shoe with frog pressure for sore quarters, contraction and corns.

185.—Front Shoe with set screw to give pressure, used on drop sole with tar oakum and leather.

186.—Hind Shoe with rim and side calk to keep off front quarters.

187.—Front Shoe, rocking shoe for vavicular diseases.

188.—Front Shoe for horse with seat bone on inside

189.—Hind Shoe for horse that pulls off shoe in stable and turn back the hoof.

190.—Front Shoe with brace above fetlock for cut tendon.

191.—Front Shoe with brace up back of

200.—Bar and center doubled bar for forging horse.

201.—Front Shoe, Hollow Grip.

202.—Front Shoe with bar toe and side calk for hoof with nail wound.

203.—Front Shoe, heel weight with four calks where calks are required with contraction, forging or stumbling horse.

205.—Front Shoe, toe weight, convex with bar for sore quarters, corn contraction and give more action for road work.

206.—Front Shoe with solid Frog pressure for soft corns.

207.—Front Shoe, Toe weight and bar with plate up the toe for sand crack; drill holes and screw plate on the hoof.

208.—Front Shoe, half bar toe and calk.

209.—Front Shoe, toe weight with grab for track work

210.—Hind Shoe for toe or quarter

218.—Hind Shoe for Toe Dragging.

219.—Front Shoe, Four Calks for chronic stumbler or sore tendon.

220.—Hind Shoe, Plain for cross fire or ankle hiter.

221.—Front Shoe, Bar Shoe for track or roadster.

222.—Hind Shoe with rim on outside and half round on inside for interferer and low, weak shell on outside.

223.—Front Shoe with heel calk and toe for toe interferer.

224.—Hind Shoe, side calks at toe to prevent cutting front quarters.

225.—Front Shoe, toe weight and heel, side calks to quicken action and prevent from pulling front shoe with hind shoe.

226.—(Between Nos. 169 and 170).—Front Toe weight rolling motion with heel and toe for horse that cuts his quarters.



Horseshoeing, Anatomy and the Average Shoer

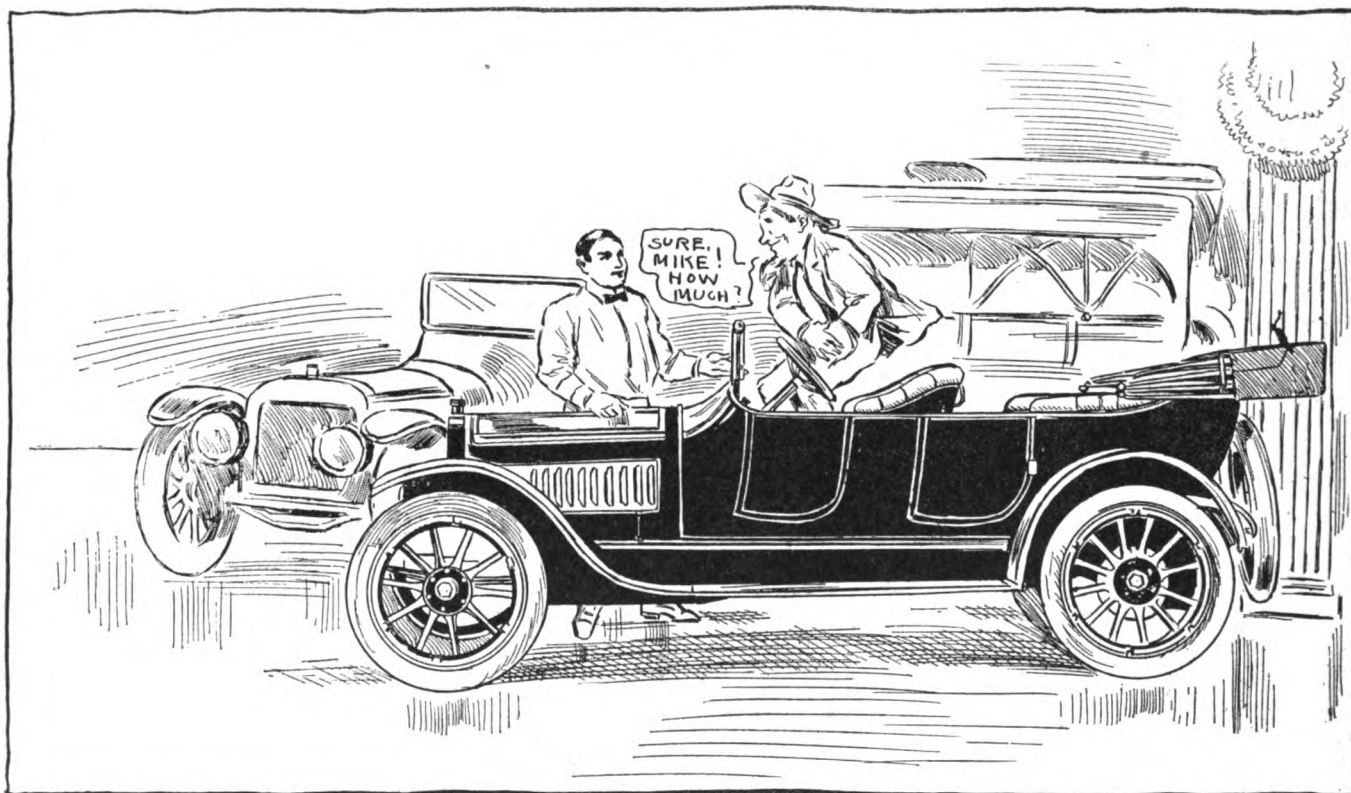
JOHN DENBO

How far advanced in general is horse shoeing? Just stop and think. Don't the smiths generally shoe as they did thirty years ago in the cities? Every once in a while you may see or hear of a certain bunch of horses being taken care of by a Special Shoer, or looked after by a veterinarian who has a shoer under him. Who is the shoer who cannot take under his care and in his own time use his knowledge on a defective foot and make a cure. Now I'll admit that it is a shame that shoers do now understand the anatomy of

closer to him and said, "Brother, how did you make out?" With an oath, he said, "They've got my money all right but I'll get it back or there will be trouble." I saw right away what had happened. That fellow had failed to pass. I learned he had gotten a good average in shoeing, but had utterly failed in the anatomy examination and a license was refused him. And he didn't get his money either. I had a chance to talk to the examiner later. He told me that the man was void of all knowledge of the interior of the foot, and he had to turn him down. Yet the law did not give the examiner authority to return the man's fee of \$5. That goes to show

are wasted just because the shoer is not given the time to execute his idea.

At the Peoria examination a man being examined was asked, "How do you shoe for contracted feet?" This is what he said as he told it to me, "I'm a farmer, a breeder of horses, and buyer. I have a little shop of my own on the farm and do my own shoeing. I went to St. Louis, Mo., last fall and bought from a brewery two fine iron-grey horses, that had become useless on account of foot trouble. I bought them at a normal sum, and had them shipped to my farm. I let them run on pasture, until freezing weather and then I put shoes on them. When I put the shoes on, I put on extra



WHY WILL A FARMER ACT THIS WAY WHEN THE AUTO SALESMAN "WORKS" HIM

the horse's feet. That is an essential thing. When you understand what you are putting a shoe on and driving a nail into then you have reached the top of the hill ready to do the work.

Not long ago, while at Peoria, Illinois, to be examined to obtain a license to shoe, I heard one of the examiners ask a brother how many bones there were in the horse's foot. He replied seven. I, of course, got interested right there. As I got to the door before he did I waited outside—I wanted to see that shoer. Presently he came out and mingled with the crowd who were waiting to be examined. Presently I came

that most men can get by in actual shoeing, but when it comes to telling you what he is doing he is lost. All some can tell is that they are shoeing a horse.

No shoer can shoe a horse to go correctly under any and all conditions. You must have some foundation to put your idea on, in shoeing a horse that interferes, while being driven on a level road as well as the one that intereferees on an uneven or rough road. As for different shoeing, for different ailments of the foot; no two, as a general rule are shod the same. Sometimes we have no time to bother with that idea, or this one, and often times good ideas

heavy ones with nail holes well back to the heel and then with a pair of tongs I spread the heel. I reset the shoes every three weeks and continued to spread the heel. "And now (that was in March he was telling me this), they are sound as a dollar, and when the weather permits I will return to St. Louis and sell them as sound."

That man, brothers, got the highest percentage in the examination just because he told of that idea; 40 — 40 just think of it, a farmer! Where did he get his learning? It's what I'd call "monkey shoeing," since he had seen his smith do it, and he did it and it worked.



(Continued from Page 245.)

The cost authorities seem united in favor of the perpetual inventory as a system for handling material. Some of the most successful say:

Perpetual inventories are undoubtedly the best, because by them it is possible to keep an exact record of stock on hand; the time to place orders for new stock is known immediately so that no part of the supply may become exhausted before a new supply is in hand.

Perpetual inventories require per-

petual attention. The difficulties in can be protected, and the buyer can be warned of the possible exhaustion of the supply.

Fourth.—A large low-water mark should be placed on each kind of raw material so that the buyer may have sufficient time to get new estimates before ordering a new stock of material.

Fifth.—Perpetual inventory records should be treated as cash is treated. Cash is verified often, or should be; so the inventory should

jobs or parts of jobs any one man may work on, he is paid for the work.

For this reason, it is necessary to keep an accurate record of all the time he devotes to the job and the amount he earns; the nature of this record, of course, depends upon the wage plan.

One of the greatest leaks in connection with labor cost is due to the workman's loss of time on account of getting started on new jobs slowly, or because of having to hunt for



—AND TALK THIS WAY WHEN THE BLACKSMITH HAS WORKED FOR HIM AND DONE A GOOD JOB?

handling them have been largely due to lack of attention on the part of employees. There are some very simple rules that should be noted.

First.—No material should be permitted to leave the raw stock-room without a requisition, signed on behalf of the department where it is to be used.

Second.—All requisitions must be checked up each night before closing; and for that purpose an hour should be established in the afternoon, after which all requisitions of the day should be held over and filled the first thing in the morning.

Third.—Low-water marks should be established by which the supply

have regular periods for verification.

Handling Labor Costs

The cost of labor constitutes a large part of the total cost of any commodity.

The object of an efficient cost system should be to see that all time of employees is properly accounted for on time-tickets and that it is charged up to the proper jobs. The scientifically managed shop will have all conditions arranged for the easy handling of the work, so no non-productive time, such as hunting for tools, materials, etc., will have to be charged up to job.

No matter how many different

tools and materials which should have been turned over to him when the job was assigned, or on account of "soldering."

Therefore, in finding the cost of labor, with a view to cutting it down as much as possible, it is essential that such loss of time should show up on the records.

All the necessary information for compiling this data is given on job tickets. On these are recorded the job number, the date, the workman's number, and the time required to complete a job together with the earnings.

Marble and Granite Tools

L. O. PLEDGER.

In the March number of "Our Journal" Brother George Bever asks for information in regard to sharp-

tool, G, and the chisel, H. The tools used to sharpen these tools on are called stakes, and are made like J and K in Fig. 2. These tools fit into the hardy hole and are held steady by a key through the shank. The

to ten teeth, and is sharpened by cutting across the end each way as many cuts as necessary to make the required number of teeth, afterwards the teeth are filed to a point about $\frac{3}{16}$ inch.

The split chisel, at B, has two flat blades and is sharpened by splitting the steel about $\frac{3}{4}$ inch deep and drawing out on the tool, at J, with the thin lip of the tool in the split and hammering on top. The bull point at D, has two points and is sharpened by splitting and hammering on top side, on tool, at J, but not quite sharp at point. The bush hammer at F has from four to ten blades in each end, those with thick blades are sharpened by drawing out on the tool at K, or on the anvil. Afterwards they are ground sharp and square, the thin blades are only ground sharp as they are too thin to hammer out.

The pitching tool at G is not sharp, but is about $\frac{3}{8}$ -inch thick on edge, and is sharpened by upsetting until the edges are sharp and straight. The chisel at H is sharpened just like a common cold chisel and ground sharp and square. The stake at K is used to sharpen the small tools on as it saves the face of the anvil.

This completes the list of granite tools. I will try to explain the manner of sharpening marble tools at another time.

Now, another word to Brother Bever. Sharpening steel is an art that must be learned. Don't become

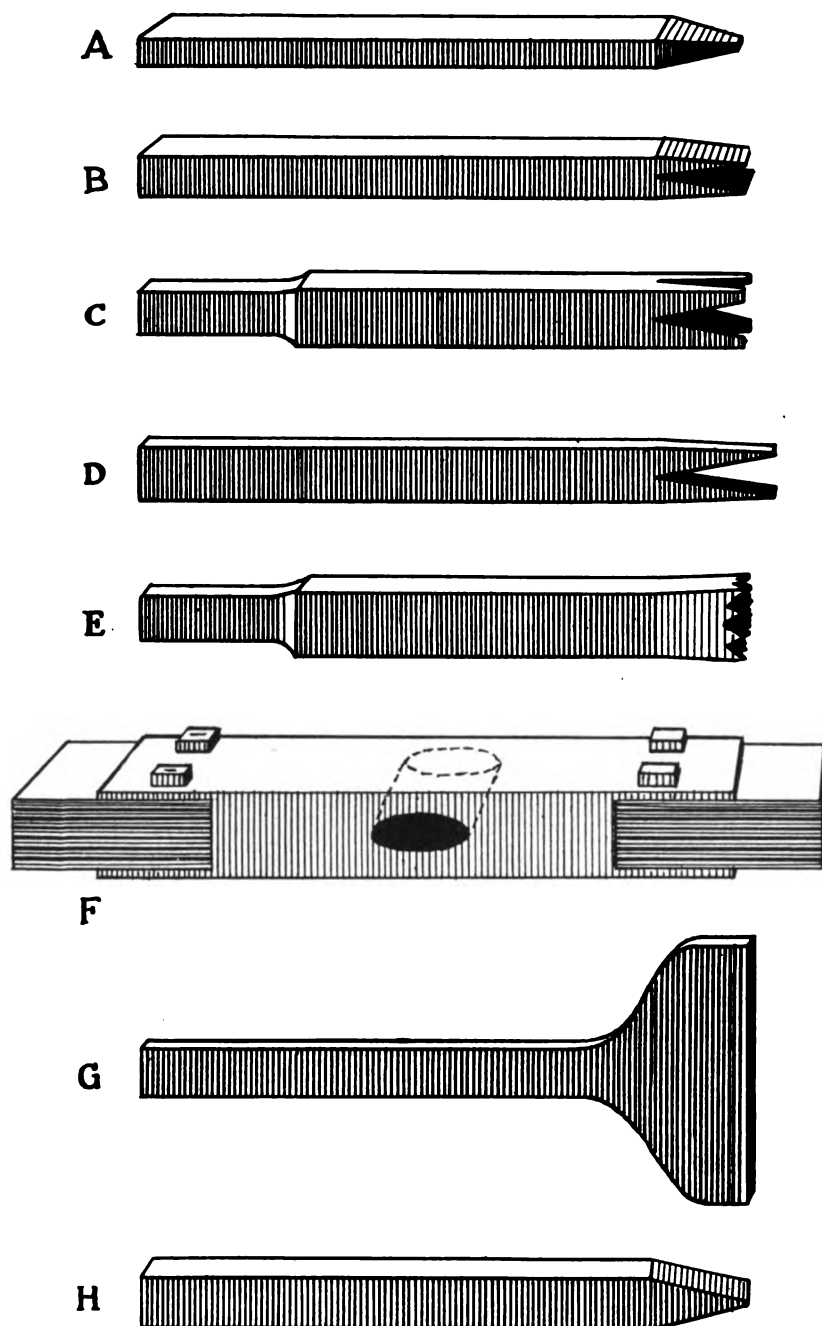


FIG. 1.—THE VARIOUS KINDS OF TOOLS USED BY THE GRANITE CUTTER

ening marble and granite tools. Brother F. M. J., of Pennsylvania, described the hardening process, but did not explain the sharpening.

If you will allow me I will explain my method of doing this class of work. The different kinds of tools commonly used by the granite cutter are:

The piont, A, the split chisel, B, the surface point, D, the froster, E, the bush hammer, F, the pitching

point at A, is sharpened by drawing down to almost a square point, about $\frac{1}{4}$ -in. by $\frac{1}{8}$ -in. and blunt on the end.

The surface point, C, has four points to sharpen it. It is necessary to have a tool like, J. The steel is split across the end both ways about one inch deep for the largest tools, and held with the lip of the tool J, in the split and drawn down to square points about $\frac{3}{16}$ inch at end. The froster, E, has from six

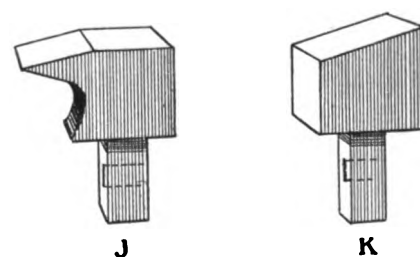


FIG. 2.—TWO ANVIL HELPS USED BY THE TOOL SMITH

discouraged if you fail at first, keep at it, you will surely succeed. Don't heat the steel too hot, and don't hammer it until it is cold. After sharpening the tools, lay them aside and let them cool before tempering.

Fundamentals of Lathe Practice

The Lathe

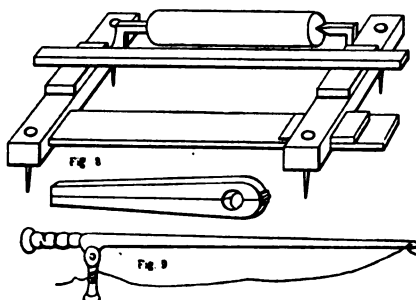
JAMES STEELMAN

The turning lathe is probably the most useful of all tools operated by power. Originally, it was doubtless



only used for shaping wood. In modern times, however, the lathe has been adapted to the turning of metals, particularly brass, bronze, cast iron and steel. Today, the lathe for the turning of metal is probably the most useful of all metal working appliances run by power—not excepting the rolling mill.

Who first invented the lathe, nobody knows. The time was probably far back, very far back, in ancient times. In India, Persia and by the



THE ARABIC LATHE WAS MADE OF METAL AND WOOD

Arabs in Egypt, rude lathes have been used in comparatively recent years and are perhaps still in use. In all three forms of lathe, the work is held between two centers. Upon these it is rotated, the operator making his cuts. It is not impossible that in the Persian lathe, the centers were, sometimes at least, arranged to turn with the work. In all these lathes, the work was rotated by means of a string which had been given a turn or so around the work. A boy helper might be employed to hold the ends of the string and to pull, first one end and then the other. Or, the ends of the string might be secured to a bow, when pushing the bow back and forth would suffice to produce the rotation. In India, the operator was accustomed to use his foot for various purposes, such as holding the cutting tool just back of the work. Where the bow was used, one workman could perform all duties. In the Arabic lathe, the long piece in front of the work is a heavy iron bar and constitutes the tool rest. The piece of the frame holding the center on the right is movable and thus provides for work of different lengths. The wedge is used to fix its position. Pins or nails are used to secure the whole apparatus to the ground or floor or table. The contrivance, consisting of two long pieces hinged together at one end and having a hole, is used to determine whether the size obtained in a finished piece is being secured in the work now in hand. The bow has a

hinged piece near the handle. This enables the workman to vary the tension of the string while the bow is in active use. It will be noted that in all the foregoing apparatus, the rotation is backward, and forward. So far as appears to be known, the first lathes to have a wheel giving always motion in the right direction, were constructed in the sixteenth century. In a book, printed about 1568, there is a wheel lathe shown pictorially. This machine appears to have been employed in metal work—that is, in turning pewter.

The modern lathe for cutting metal may have but few features. If the work is long, one end is given a suitable depression to fit up against the center in the tail stock. This center is a pointed piece of metal arranged in a fixed, horizontal position. The work rotates upon the fixed point. As the work will naturally vary in length, it is necessary to have some means of shifting the pointed center back and forth. For this reason, the center is movable in the tail stock and the tail stock is movable along the bed. The head stock of the lathe is the frame which contains and supports the chief rotatable parts. It is set up in an unalterable position opposite the tail stock. A normal function of the rotatable parts is to grasp the work firmly and thus impart their own rotational movement to the work. That is to say, the work is rotated by the rotating parts in the head stock. This arrangement makes it possible for the operator to make his cuts. If the work is long, the tail stock with its pointed center supports the one end.

A principal member of the group of parts rotated in the head stock is the spindle. This is a very important piece. In a typical lathe, it will be a rather long, hollow shaft. It will be supported in journal boxes at either end. The bearings are thus wide apart. This is a matter of importance for the reason that when the bearings are widely separated the spindle may be made to run truer. The longer each bearing is, measured lengthwise of the spindle, the better for good work. The wear and tear is then distributed over a goodly surface and will consequently be less in thickness. That is, the greater the length of the journal bearings, the longer they will closely fit the spindle.

Between the two bearings, the cone pulley will be mounted on the spindle. It may be so arranged that cone pulley and spindle rotate

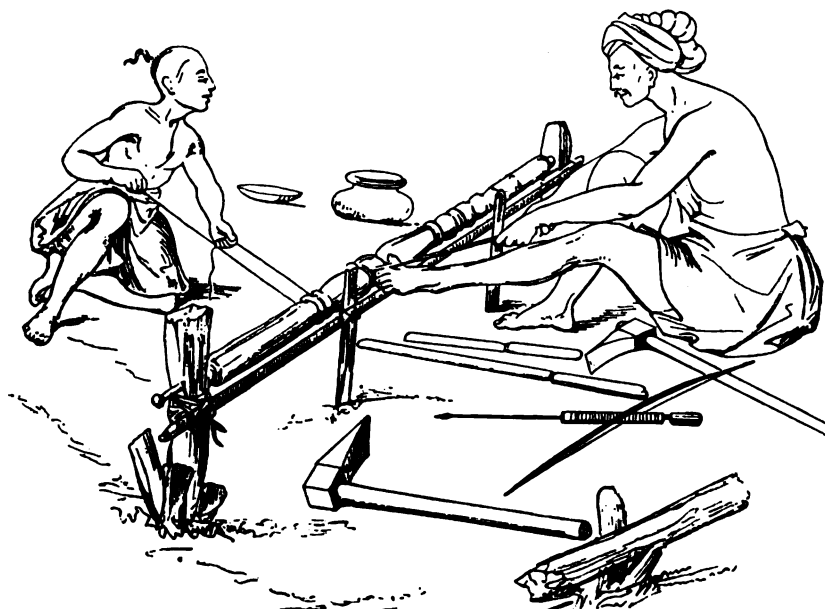
as one piece. The function of the cone pulley is to enable the driving belt to rotate the spindle. The object of having a variety of diameters for the belt to work on when driving the cone pulley is to provide for changes of speed. When the belt is on a large diameter part of the cone pulley, the spindle will rotate more slowly than when the belt is on a small diameter part.

The face plate is a circular piece which is screwed onto the right hand end of the spindle. The belt in rotating the cone pulley will in fact rotate also the spindle and the face plate. All three parts rotate as one single piece. In the center of the face plate end of the spindle will be a socket into which a center may be set. This center supplies a pointed pivot similar to the center arranged in the tail stock. The two centers are often used when it is desired to turn long work and support it very accurately at both ends. The center in the spindle, however, is not properly a pivot as the work does not turn upon it. The work is secured by some suitable means so as to turn with the face plate. Accordingly, work, face plate, spindle center, spindle and cone pulley all turn as a single piece. The tail stock center is *dead*; the spindle center is *live*.

When the work is short, it is often handled without the tail stock and its center. A *chuck* is temporarily secured to the spindle in such way as to rotate with it. This device grasps the work and holds it firmly. A familiar type is the *universal chuck*. This piece of apparatus is frequently provided with three jaws arranged so as to move simultaneously in and out from the center. When the universal chuck is in working position, the operator may cause the three jaws to close in on the outer edge of the work. If this outer edge is circular, the jaws will close in equally and thus bring the work to a position in which its center is in



ANOTHER PRIMITIVE LATHE—ONE OF PERSIAN MAKE



AN ANCIENT TURNING LATHE AS USED IN INDIA

line with the axis of the spindle of the lathe. This is a very important thing, as the automatic action of the chuck secures at once what might otherwise require a good deal of time to obtain. The jaws on the universal chuck may ordinarily or frequently be used to hold work from the inside. Thus, if the work has an inner edge in the form of a circle, the jaws may be made to spread apart equally and hold the work in such way that its center is in line with the spindle axis.

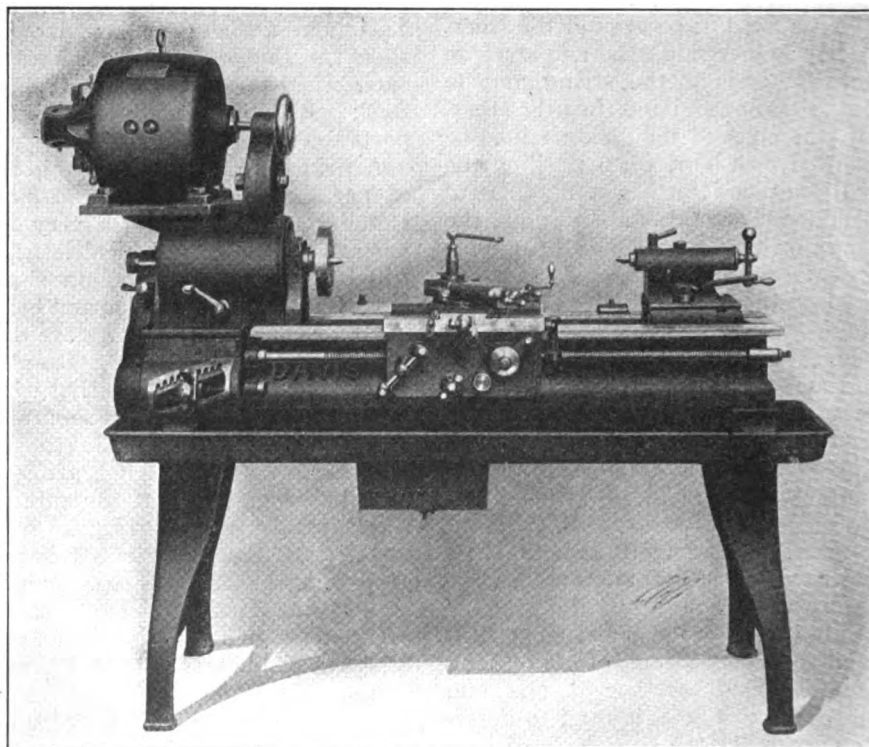
The *bed* of the lathe is the horizontal frame which at one end supports the head stock and for a considerable part of its length provides a kind of track along which the tail stock may be shifted.

It is usual so to arrange the dead center in the tail stock that it may be moved back and forth a short distance without disturbing the tail stock's position on the bed. This is advantageous, because it permits work to be put on and taken off the lathe without moving the tail stock itself.

In the foregoing account of the spindle and the cone pulley, the two were regarded as substantially one piece rotating as a unit. That is, the pulley was so mounted on the spindle as to carry it with it when the pulley was driven by the belt. But arrangements are not always thus. Sometimes, often in fact, the cone pulley is so mounted on the spindle that it is possible for the operator to choose whether the two shall rotate together or whether the pulley shall slip round on the spindle without rotating it. Of course, the spindle must somehow or other be rotated $1/16$ of a turn of the spindle. That

and the cone pulley must accomplish it. The necessary result is gotten indirectly. For example, a gear wheel may be arranged at the little end of the pulley and about the same size as the smallest *step* on the pulley. This gear wheel will be fixed to the pulley so that when one rotates, the other will do so too. Back of the head stock a short shaft will be set up parallel to the spindle. There will be, say, two gears on this shaft, one a large gear meshing with the small gear on the pulley. At the other end

of the shaft, a small gear will be located. This will mesh with a large gear on the spindle close up against the big end of the cone pulley. All these gears are tight on their respective mountings. Now suppose the pulley to turn. It will not carry the spindle with it, because the two are not locked together. When the pulley turns, however, it will by means of its small gear make the big gear on the back shaft turn. This results in the shaft turning; and this makes the small gear at its other end rotate. Finally, this small gear causes the big gear on the spindle to turn, thus rotating the spindle itself. Suppose the two big gears have 72 teeth each and the little ones 18 each. When the pulley goes round once, its little gear with its 18 teeth meshing in the 72 teeth of the big gear on the back shaft will make the back shaft rotate $1/4$ turn. It will be exactly $1/4$ of a turn, because $18 \div 72 = 1/4$. Now the back shaft in one turn will also rotate the spindle $1/4$ time, because the little gear on the shaft with its 18 teeth is in mesh with the big gear on the spindle with 72 teeth. One turn of the back shaft, then, will rotate the spindle $1/4$ time. One-fourth turn of the back shaft will effect, therefore, $1/16$ of a spindle rotation. We see, then, that one single turn of the cone pulley results in $1/4$ turn of the back shaft, and this $1/4$ turn of the back shaft results in



A MODERN METAL WORKING LATHE FITTED WITH A VARIABLE SPEED MOTOR



is, one turn of the cone pulley rotates the spindle inside of it 1/16 time. This arrangement with a short shaft and gears is called *back gearing*. A lathe fitted thus is said to be *back geared*. Sometimes, the gear arrangements for the drive of a lathe are very elaborate, indeed. The complicated cases will be beyond the scope of the present account. The object in view both with the various steps of the cone pulley and with the back gear arrangements is to secure varieties in the speed with which the lathe may be driven.

The *lead screw* of a lathe is a long screw mounted on the bed lengthwise of it. This screw is so arranged and is so connected with the spindle by means of gears that when the spindle turns, so also does the lead screw. The gearing may be so managed that we may obtain various relations between the spindle and screw. On even a simple lathe, we may make various changes, and on more elaborate lathes a great variety. It may be desirable to have the screw turn once while the spindle turns twice; or we may want the two to rotate exactly together; or we may wish some other relation to exist as the lathe runs. The purpose of making such changes is to control the movement of the cutting tool lengthwise of the lathe when screw threads are to be cut.

Accordingly, an attachment or part of the lathe known as the *apron* is so arranged that it may be in mesh with the lead screw. When the lead screw turns, the apron will then move along the bed either to the right or the left, according to the direction the lead screw may be rotating at the moment. The apron is really a part of the *carriage*. The carriage proper is a horizontal piece on which are mounted the tool holding arrangements. There is a vertical plate which hangs down from the carriage exterior to the bed. This is the apron. Carriage and apron are in effect a single piece.

On the ordinary carriage, there will be mounted a *compound rest* in such way that it may be shifted along the carriage parallel to the axis of the lathe and locked in any desired position. The compound rest is a device for holding the *tool post*, the upright piece to which the cutting tool may be secured. However, the compound rest is so made that it may not only be shifted as a whole along the apron, but may also have its upper part advanced in towards the work or moved out away from it.

(To be Continued.)



Benton's Recipe Book

To Renew Engine Batteries, Mr. F. H. Wood suggests the following: "Take six wide-mouthed two quart fruit jars, place in each one pint of white vinegar. Then take an old fry cell that still has a good zinc for each jar, punch several holes in each cell, place in jars and connect up. Now fill jars nearly to the top of the dry cell with strong salt brine, put in a little oil to prevent evaporation and you will have a good snappy battery at a few cents expense."

For Painting Galvanized Iron a painters' association recommends the following: For colours, four coats. First coat, copper acetate solution. Second coat, red lead mixed with 50 per cent. of oil and 50 per cent. of turpentine without driers. Third coat, white lead mixed with equal proportions of linseed oil and turpentine stained to conform to the final colour. In the last coat 80 per cent. of lead and 20 per cent. of zinc oxide or other paste driers mixed with the oil. The alternative recommended is for white and light colours, five coats in all shall be applied, the first two as above mentioned, the third and fourth lead mixed with 50 per cent of oil and 50 per cent. of turpentine, and the fifth coat 80 per cent. of lead and 20 per cent. of zinc oxide mixed with oil.



Queries- Answers- Notes

On Axle Fitting and Tire Welding.—I would like to hear of some brother who has some new way to fit new wagon axle; I mean a wooden axle. I also would be glad to know of a way to hold a tire in place after it is scarfed, ready to weld. My way is to take my shoe punch and punch a hole through the place where it is to be welded and then cut off a horse nail and put it through and clinch. I

think there is a simpler way than that.
Ed. B., Montana.

Wants to Temper Harrow Teeth.—Would some one tell me how to temper spring harrow teeth? Would appreciate reply very much. A. LAFARE, Michigan.

A Steam Engine Query—In what position should the eccentric be set on the crankshaft relative to the position crank pin on the disk wheel of a slide valve or rocker arm steam engine?

W. D. B., Missouri.

To Make a Ford Truck—Will some brother blacksmith please tell me through our paper how to take the hind seat off a five passenger Ford car and make an auto truck of it? D. J. HILLS, Mississippi.

On Shoeing Track and Work Horses—In answer to Mr. Laharn, his faults are those of a pacer, and not having ever shod a pacer I must refer him to the track shoers. It appears to me that we are working at cross purposes and that the track men who advocate clearing in motion are practically dealing with both interfering feet in the air making weighting the biggest factor of prevention. Where as we who are shoeing the workers either hacks or harness have generally to clear with one foot on the ground, and not—dealing with weights, we often attain our object by exactly the reverse treatment. The shoer who is doing work for both fast and slow horses will be inclined to carry the system which suits the most of his work through the lot. But I think we can all agree to start from a level foot and a level shoe, and when we have gotten our horse clear and healed, work as far back to the level as he will clear, seeing that his level is normal.

JOHN A. MUNRO, Australia.

The Automobile in the South.—Business seems to be rushing. Farmers are coming into the city and around here one can see about as many horse and wagon outfits as autos. One smith at Chattanooga, Tenn., remarked to me that if the people kept on buying cars the smiths would lose their jobs. Now and then you will notice a new sign, "Blacksmith and Auto Repairing", instead of "Blacksmith and Horse-shoeing," and where the old horse used to stand one can now see a dismembered car. Yes, you can still see by the holes in the floor where the old horse stood I find lots of wood working shops that used to be blacksmiths' shops. You won't find the farmers driving fancy work horses, but you can see all the mules and plugs were hitched up to all sorts of rigs. Down in Florida they use oxen especially harnessed up to buggies driven with one line. My travels carried me down there last fall.

The old village blacksmith is still to be found as I can remember in the old days before the auto came along, but nearly every one has the new sign up, "Auto Repair Shop." In regard to the financial standpoint, I think the South is now at a turning point and money will be plentiful, yet I hear quite a number of farmers complaining that they have not got any money.

I feel that the old horse will be in style for several years yet, on account of the bad roads which, when once laid out, were never improved. Now in regard to the motor truck, I want to say there are plenty here and quite a number are being used as shut cars or carryalls. The smiths seem much interested in the "Auto Department." A. TRAVELLER, Alabama.



The Automobile Repairman

Locating Carburetion and Ignition Troubles

VICTOR W. PAGE, M. S. A. E.

One of the most frequent derangements of the automobile engine is irregular operation or "skipping." This is a very annoying condition and as it is apt to occur at any time in all cars the automobile repairman will be called upon to remedy the defective condition very often. The tourist who has this trouble will expect much better service than the local customer so it seems advisable to discuss the systematic location of the troubles in the two main auxiliary groups that are most apt to result in lack of smooth running of the engine. The carburetion system is often responsible, but in most cases the trouble is due to some defective ignition system component.

It is not difficult to tell if the carburetor is out of adjustment. If black smoke comes out of the muffler it indicates that too much gasoline is being supplied the mixture and the supply should be regulated and reduced by screwing in the needle valve on those types where that method of regulation is provided. It is also necessary to make sure that the float level is at the correct height where the spray nozzle has no means of adjustment. If the gasoline feed cannot be regulated, the mixture must be thinned down by admitting more air. If the gas contains too much air and is deficient in gasoline vapor a pronounced "popping" back will be evidenced in the carburetor. This may be eliminated by screwing in the air valve adjustment or regulating the air openings so less will be admitted or by slightly opening up the gasoline supply regulation needle. If a carburetor is properly adjusted, and the mixture

delivered to the cylinder burns properly, the exhaust gas will be free from the objectionable odor present when gasoline is burned in excess.

If a muffler cutout is provided, the character of combustion may be judged to some degree by noting the color of the flame which issues from it when the engine is run with an open throttle and retarded spark after nightfall. If the flame is reddish it indicates too much gasoline, and if yellowish in color, it shows an excess of air. A properly proportioned mixture will be evidenced by an almost colorless blue flame. A common source of trouble is dirt or water in the gasoline, so it is well to provide a fuel filter in the pipe line. This consists of a chamber in which the impurities may settle because they have a greater weight than

are generally due to some faulty carburetor adjustment. There are a number of other troubles apt to occur and while the symptoms are similar to those caused by ignition system faults the operator who is familiar with carburetor action should have no trouble in locating them quickly and ascertaining positively if they are the result of faulty carburetor action or due to the ignition system. Considering the various causes which contribute to irregular motor action we have: Foreign matter such as dirt or water in the carburetor, clogged fuel pipe, obstructed spraying nozzle, clogged gasoline filter, leaky metal float or fuel logged cork float, poor or stale gasoline, a loose throttle valve or sticking air valve, a loose inlet valve stem which permits of sucking in

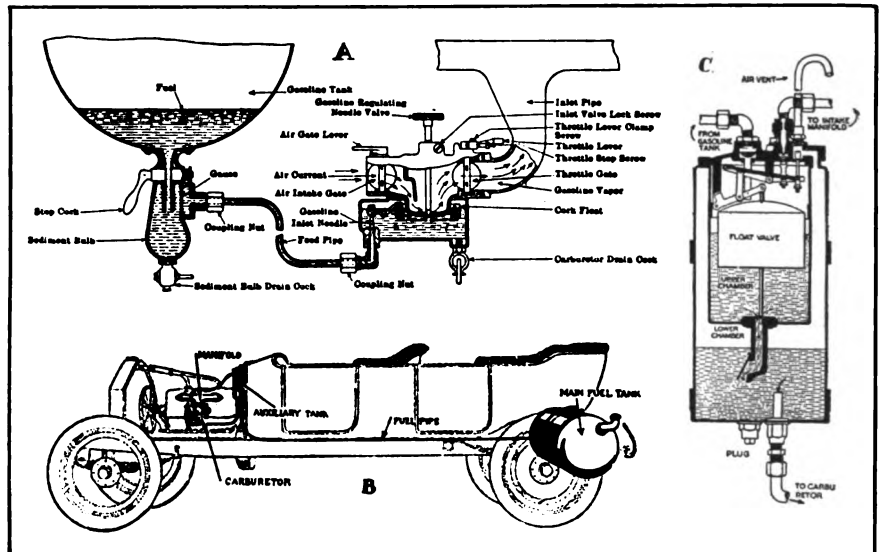


FIG. 1.—THREE POPULAR FUEL SUPPLY SYSTEMS: A, THE GRAVITY SYSTEM OF THE FORD. B, SUCTION SYSTEM WITH FUEL TANK LOWER THAN CARBURETOR. C, STEWART VACUUM SYSTEM SHOWING INTERNAL CONSTRUCTION

gasoline and sometimes filtering screens of wire gauze are included to catch light particles such as lint, scale and rust which will remain in suspension in the liquid. Unless frequently cleaned and drained the filter body is apt to become filled with dirt and some of this foreign matter will invariably clog the carburetor or the pipe line. Particles of lint may fill the filter screen mesh in time and prevent a free flow of liquid. It is important, therefore to examine the gauze screens from time to time and clean them off.

Once the repairman has learned how to adjust a carburetor correctly, he will realize that he has found a remedy for many of the motor troubles, as misfiring, back firing in the carburetor, loss of power, etc.,

air on the suction stroke and air leaks around the inlet manifold or carburetor packing.

If the motor stops suddenly and the ignition system is known to be in good condition the following points can be suspected: The gasoline tank may be empty, the shut-off valve in the gasoline pipe may be closed, due to it having jarred partly or wholly in the "off" position because of vibration or a choked spray nozzle which does not allow any gasoline to spray into the carburetor may cause the trouble. As a cold motor and stale fuel are the most common hindrances to prompt starting, the first step is to prime the carburetor by pressing the "tickler" down until the gasoline runs out of the overflow hole in the



mixing chamber or around the primary air opening. This indicates that the gasoline reaches the carburetor, at least, the float chamber portion of the carburetor. It may reach the float chamber all right and yet not be sprayed into the mixture properly because of a partially constricted spray nozzle.

In any event the best way is a systematic search and, to find the difficulty, without undue delay, the various parts of the fuel system should be examined in a logical order. First, one should inspect the tank to make sure that it contains gasoline. The filter screen in the carburetor or filter should be removed and cleaned since the fine mesh is apt to become clogged with dirt or lint filtered out of the fuel. If the filter screen is in good condition, test the pipe line for obstructions. Open the petcock under the float bowl of the carburetor and if the pipe is constricted but little or no fuel will be forth coming. If no gasoline issues and there is a plentiful supply in the tank, the next thing to make sure of is that the drain cock is not stopped up. This can be tested by sticking a wire through it when it is in the open position. If the passage is clear and no gasoline comes out it is reasonable to assume that the supply pipe is stopped up. In this case both ends should be uncoupled, and the interior of the pipe cleared out by putting a stream of compressed air through it. A clogged spray jet will sometimes be found the cause of trouble and as the opening in this standpipe is very small the least particle of scale, water or lint will be enough to restrict the area of the orifice and deprive the engine of the proper amount of fuel. It is sometimes possible to dislodge the obstruction through flooding the carburetor by holding the "tickler" down, though the best method is to poke it out with a fine wire passed through from one end to the other. Compressed air may also be used for blowing out the offending particles.

Fine particles of lint sometimes work through the strainer and collect into a small ball which floats about and which is sometimes sucked into the nozzle by the suction of the engine. A drop of water will act in the same way. In a case of this sort the motor will start easily enough, but invariably commences to misfire, slow down and it may come to an actual stop. This peculiar action results because the greater suction of high speed draws the

dirt into the jet and so chokes the bore of the nozzle. As the motor slows down and the suction becomes less the obstruction will fall away from the jet opening. It is sometimes possible to eliminate this trouble by racing the motor and opening the throttle valve suddenly. This will give a momentary increased suction which is sometimes sufficient to suck the particles of grit through the nozzle opening.

If the repairman notices continuous flooding or dripping from the carburetor, this points to either a

as possible should be used. A cork float will gradually absorb liquid owing to its porous nature, and will naturally lose its buoyancy, as it becomes heavier. The remedy is a simple one, the float being placed in a moderate oven so it will be thoroughly dried out and afterwards given a couple of coats of schellac dissolved in grain alcohol. Another reason for poor engine action is clogging of the air screen with dust, though many carburetors do not have this fitting.

Misfiring is often caused by ignition troubles and these are usually evidenced by irregular engine action. The motor will not run regularly nor will the explosions follow in even sequence if there is any ignition trouble. If one cylinder of a multiple cylinder motor will not function at all the trouble is local and will be found in the spark plug of that cylinder. However, if the irregular operation extends to all the cylinders there is some main condition outside of the engine itself that is causing the trouble. A systematic search for the unit at fault can be followed to advantage in locating ignition troubles just as much as in finding carburetor faults. The steps to follow, of course, depends upon the type of ignition system used. The first step, in any event, is to find the "missing" cylinder by testing each of the spark plugs in turn by short circuiting so that it will not spark. This may be easily done by using a screw-driver and connecting the insulated terminal at the top of the spark plug with any metal part of the engine. When the faulty spark plug is short circuited it will have no effect on the action of the engine. If, however, the trouble seems to be general and all cylinders fire intermittently all of the spark plugs should be taken out of the cylinder, left connected to their wires and laid on the cylinder in such a way that the insulated terminal is not in contact with any metal part. The engine is then turned over slowly by the hand-crank and the points of the plugs watched to see if any spark occurs between them. If there is no spark at any of the plugs this may be considered a good indication that there is a broken main current lead from the battery, a defective ground connection, a loose battery terminal or a broken battery connector. On the Ford car, if there is no spark at the plugs and the spark coil vibrator functions properly this shows that the primary wiring or

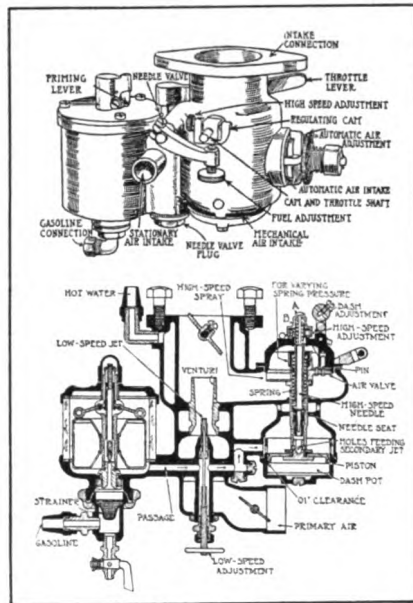


FIG. 2.—TYPICAL MODERN CARBURETORS SHOWING POINTS NEEDING ADJUSTMENT AT TIMES. AT TOP RAYFIELD—AT BOTTOM STROMBERG DOUBLE JET

badly seated float regulated needle valve, a leaking metal float or a fuel soaked cork float. If the control valve is at fault, this is probably due to poor seating. The valve should be carefully ground in by using a very small amount of powdered grindstone dust or very fine emery flour and oil. Both the valve and its seat should be smooth and bright when the work is finished. In types where the valve spindle passes through the float it sometimes becomes bent. In this case the bent spindle must be removed and should be placed on a block of wood and straightened with a few taps from a very light hammer.

If the carburetor has a metal float, in cases of continual flooding, examine it for minute holes or leaky seams which must be carefully soldered up. In order not to disturb the balance of the float, as little solder



low tension wiring is working properly and that the fault must be looked for in the secondary or plug wires or at the plugs themselves. The spark plugs are often short circuited by defective insulation or by carbon and oil deposits around the electrodes. The secondary wires may be broken or have defective insulation which permits the current to ground some metal part of the frame of motor.

The battery strength should be

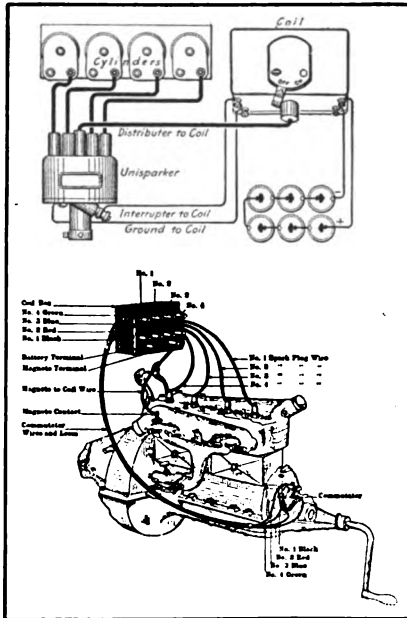


FIG. 3.—TYPICAL IGNITION SYSTEMS — ATWATER — KENT UNISPARKER AT TOP, FORD MAGNETO AND COIL IGNITION SYSTEM BELOW

tested with a voltmeter if it is a storage battery or an ampere meter, if it is a dry cell battery. The storage battery should show at least six volts for a three cell battery, while dry cells that indicate less than six amperes are not considered reliable or satisfactory for ignition service with the vibrator coil. If, however, there is no vibration at the coil trembler and this is not improperly adjusted the trouble may be due to a weak current source, broken timer wires, defective connections at the vibrator or dirt in the timer.

If a one unit non-vibrator coil system is used for ignition the trouble is often located between the contact points of the timer which may become pitted or oil soaked or lose their correct adjustment or to dirt in the secondary distributor portion of the timing device. The electrodes of the spark plugs may be too far apart to permit a spark to overcome the resistance of the compressed gas even if a spark jumps the air space

when the plug is laid on the cylinder. If magneto ignition is fitted and no spark is obtained between the points of a plug, the trouble may be caused by the magneto being out of time. This, however, is a rare occurrence. If no spark is produced at the plugs the magneto ground wire is probably short-circuited with some metal part of the chassis before it reaches the switch; the carbon collecting brushes may be broken or not making contact with the current collector ring or segments. The contact points of the make and break device may be out of adjustment, pitted or burnt; the wiring may be attached to wrong terminals; the distributor interior filled with metallic particles, carbon dust or oil accumulations; the distributor contact may not be making proper connection because of weak spring pressure back of the brushes and there may be a more serious derangement, such as loss of field magnetism due to a reduction in the magnet strength; a burned out secondary winding or a punctured condenser.

The following is considered a logical order in which the various points of the ignition group should be inspected and the parts which experience has dictated demand inspection oftenest are considered first: Weak source of current due to worn out dry cells or discharged storage batteries; weak magnets in magneto or defective contacts at magneto; dirt in magneto distributor or poor contact at collecting brushes. If a timer or distributor is used in connection with battery ignition the interior may be dirty, the points may be out of adjustment and there may be a short between the low and the high tension portions of the device. If the device wabbles or has loose bearings, the primary contact will be very poor. The insulating ring at the timer or distributor or the fibre or hard rubber insulating bushings in the magneto or timer may allow loss of current if they are cracked. A poor ground contact at a commutator of a high tension system will cause irregular ignition. The spark plug should be inspected for dirty or cracked insulation, excessive space between electrodes, the points too close together, loose central electrode or loose point on plug body, sooty or oily particles between the sparking points or on the surface of the insulator.

When testing a dry battery the terminals of all the cells should be gone over carefully to make sure

that all terminal nuts are tight and that there are no loose or broken cell connectors. In a battery ignition system or in a transformer coil magneto system, all wiring should be carefully inspected to see that the connections are tight and that the insulation is not chafed or cracked. Defective insulation allows leakage of current, while loose connections result in irregular engine operation. On the Ford car, which is the only car marketed in any quantities using vibrator coil ignition, the platinum trembler contact points on the top of the coil units be examined for pits or carbonized particles that would interfere with good contact. The surfaces of the platinum points on both the vibrator spring and the

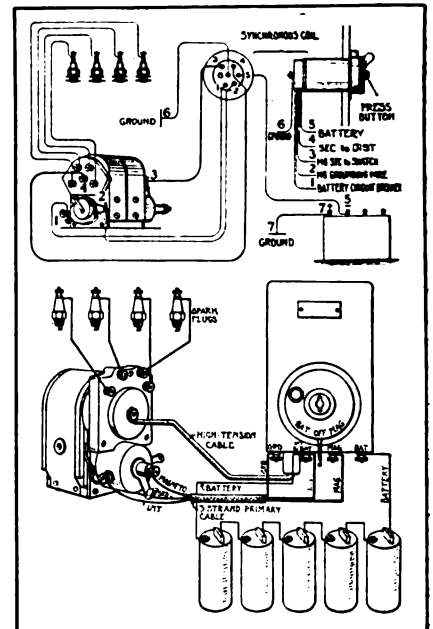
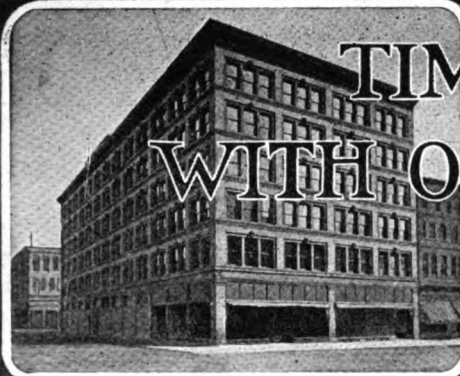


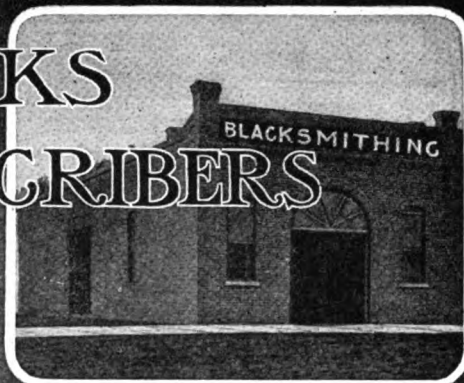
FIG. 4.—MAGNETO AND BATTERY IGNITION SYSTEMS. BOSCH DUPLEX AT TOP, TRANSFORMER COIL SYSTEM AT BOTTOM

bridge member should be filed smooth to insure positive contact. The tension of the vibrator spring should not be too light or too heavy. The vibrator should work rapidly enough to make a sharp buzzing sound when contact is established at the timer and the switch is on the battery position. If an engine stops suddenly the defect is usually in the ignition system and the trouble is rarely more serious than a loose or broken main wire.

There is not enough space at the writer's disposal to consider each ignition system unit individually, though it is intended to give a complete discussion on the care of the storage battery in an early issue.



TIMELY TALKS WITH OUR SUBSCRIBERS



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A QUESTION AND THE ANSWER

"Doesn't anyone ever tell you that your paper's no good?" asked a reader some months ago. We had to admit that it had been a long time since anyone had said so, "but" we added "when anyone does say that we will print the letter and present both sides of the question."

And as such things oft times happen, we shortly afterward received this letter from a Nebraska reader. He writes:

"Please stop my paper. I've read it for a year and now with my eight years of experience don't think I need it. I know my trade and there's no use reading about things that I know."

Here, as we read it, we realized, was the long looked for letter telling us "Our Journal" was no good. And as we read and re-read this letter we wondered what kind of smith the writer of that letter could be. We wondered how experienced he really was. We wondered what he had accomplished in his eight long years of experience that veterans with twenty, thirty and forty short years behind the anvil had not learned.

And as we wondered we opened the other mail of that morning. These are just a few of the letters from other readers:

"I expect to take the paper as long as I can see to read. It is worth far more to me than the price paid to get it."

L. E. BRIGHT, Nebraska.

"Our Journal is the best and cheapest paper that I ever saw of its kind. I get so many helpful ideas out of it, I wouldn't be without it at all."

D. SUTTON, Missouri.

"I have received but two copies of the paper and can say it is the best paper I ever saw. I can hardly wait till it comes. I will gladly give it a boosting word every chance I get."

O. D. HIXON, Tennessee.

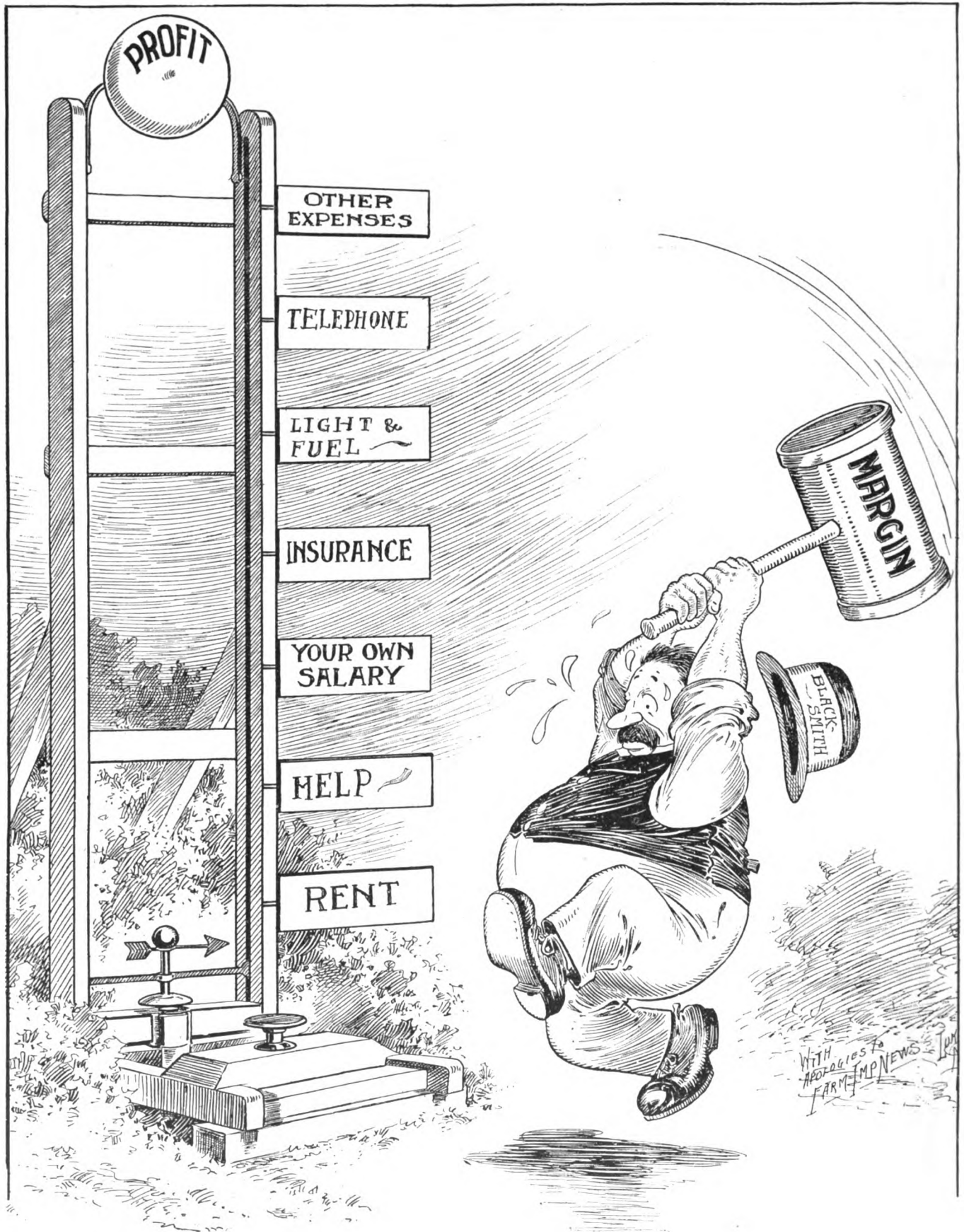
And then as a sort of a chinker for any argument for the worth of "Our Journal" we came across a letter received sometime ago a York State veteran. He writes:

"I could not get along without Our Journal. I have been doing general blacksmithing for forty years, but I learn something from Our Journal every month."

L. E. LACY, New York.

Here a man with five times as much experience as our Nebraska friend and yet he finds new things every month in "Our Journal" while the man of eight years experience thinks he knows it all.

Now, Mr. Reader, here are the facts. Someone has practically said "Our Journal is no good"—In the same mail were other letters reprinted above. You have the evidence before you. What is your verdict as Judge?



IT TAKES A HARD BLOW TO RING THE BELL

The blacksmith is usually a heavy hitter. He knows how to swing the sledge and can deliver a hard blow when called upon. But the hardest blow he has to deliver is when he tries to make expenses and hit the gong of profit. The margin has to be a big one these days and it has to be swung accurately and hard to send the little weight up the list of expenses and ring the bell "Profit".



Shoeing the Horse that Interferes

L. H. JOHNSON

WHEN a horse in motion strikes one leg with the opposite foot, the animal is said to interfere. The blow is usually struck on the inner surface of the fetlock joint, though it may be above or below this point. The injury resulting may involve the coronary band, the fetlock joint or may even extend to the knee. While the blow from the foot may cut the skin and bruise the deeper tissues it may also be so slight as to scarcely disturb the hair. The injury may cause lameness, swelling of the lower leg, fever in the injured parts and dangerous stumbling. Interfering is more frequently seen in the hind legs than in the fore legs.

In detailing the causes of interfering let us understand right here that interfering caused by improper harnessing, careless driving or weariness cannot be prevented by shoeing. In the above causes the remedy lies entirely with the groom and driver. If the animal is harnessed correctly, is evenly hitched in the shafts and allowed to walk when tired, no injury from interfering may be feared from these temporary causes.

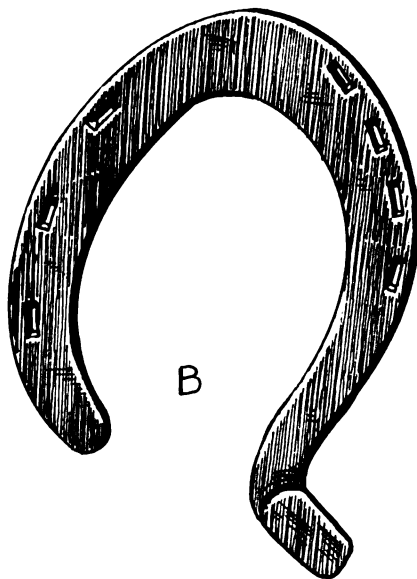
The principal causes of interfering are the conformation or position

of the legs, improper shoeing, rough or slippery roads, improperly trimmed hoofs, or it may be caused by diseased leg or foot tissues.

In shoeing to cure or prevent interfering let it be understood that no one shoe, or system or method of shoeing will suffice for all cases of

ming the hoof in such a manner as to throw the fetlock out of the path of the opposite leg. This practice, however, is not good, inasmuch as it throws the leg out of line. And one of the first principles of correct horseshoeing is to get and keep the feet of the horse in proper relation to his body. Another practice which should be discouraged is the setting of the shoe back from the edge of the hoof. This does not assist the prevention of interfering and will in time, if continued, change very materially the conformity of the hoof.

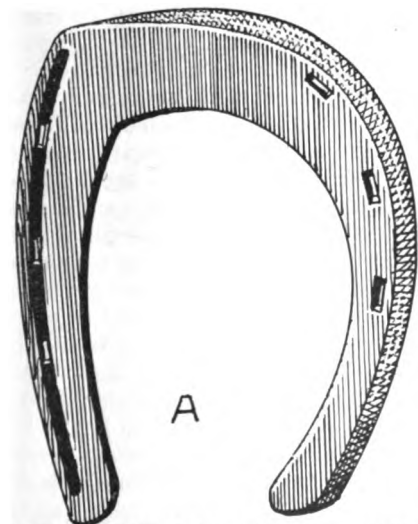
As for the line of effort to follow in shoeing for interfering let us bear in mind the value of weighting. This can, however, be overdone, and too great a weight placed under the foot on one side or the other. There are some who recommend using just as much weight as is necessary to bring the foot away from the limb it persists in striking. This practice, however, is not commendable, for the simpler and lighter the shoes are kept the less the horse will interfere. Great lumps of iron on the feet cause the horse to handle his feet



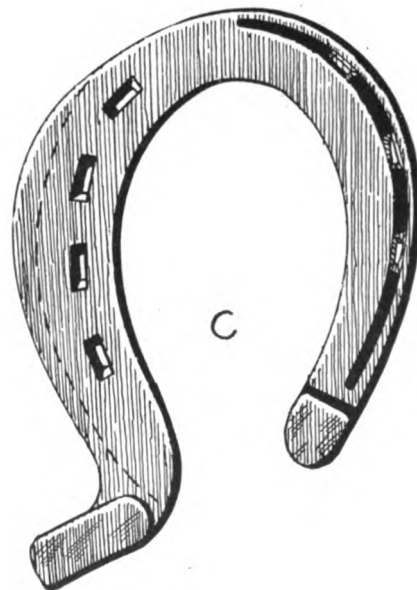
FOR INTERFERING HIND—THE LONG HEEL IS ON THE OUTSIDE

interfering. Nor can the same method always be used successfully in practically parallel cases in two different animals. No cast-iron rules can be laid down for the guidance of the shoer of interfering horses. What will apply in one case may need to be reversed in other cases. There are, however, some points that the shoer may do well to remember in treating interfering.

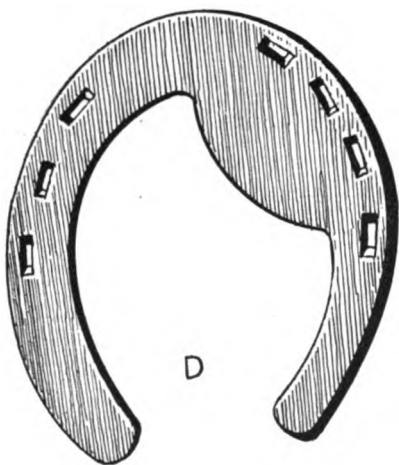
Should the cause of interfering be faulty conformation or deformity it may be impossible to overcome the trouble. In such cases the best and only thing that can be done for the animal is to apply the ankle boot. Sometimes, however, if the interfering is very slight an outside weighted shoe will give the desired results. Some shoers attempt to overcome the striking by paring and trim-



A SHOE BEVELED ON THE OUTER BRANCH



ANOTHER LONG HEELED SHOE WITH OUTSIDE WEIGHT



A SHOE WEIGHTED AT THE POINT OF CONTACT IN INTERFERING

clumsily and to become fatigued, comparatively, very quickly. And fatigue is one of the causes of interfering. Whereas, if the shoes are kept as light as possible, the weight necessary to throw the foot to one side in its passage will not need to be very great, and the horse will handle his feet better and not tire nearly as quickly.

A number of shoes are shown herewith. These may be used in one form or another to prevent interfering. At A is shown a shoe beveled on the outside, but creased and rather lighter than the outer branch. The shoe at B is for interfering hind. The inner branch is regular in form while the outer branch carries a long heel with a heel calk. This shoe is made as light as possible. Another shoe with heel extension is shown at C. This shoe, however, is weighted on the outside. Another weighted shoe is shown at D. The weight in this instance, however, is carried at the point at which the foot comes in contact with the opposite leg. The shoe at E is fitted with a toe calk on the inside branch as shown and between the first and second nail holes. The small calk on the outer branch is between the third and fourth nail hole. There must also be a heel calk of the same height on the inside heel. The shoe shown at F has a long calk on the inside branch, extending as shown from the toe to the heel. The outside heel is made rather heavy with a calk. The shoe at G is rolled on the outside from middle toe to the heel. The inside branch of this shoe should be flat and level. This is for the front foot. The shoe at H is a hind shoe made light on the inside branch. These shoes will not apply to all cases. Each case must be considered individually. Determine as

near as possible the position of the animal's limbs and feet when in motion and apply the shoe most likely to prevent his interfering. If the first shoe does not stop it entirely determine to what extent the trouble continues and base further shoeings on your findings.

When interfering is the result of faulty conformation of the limbs ascertain just what part of the foot does the striking and then diminish the size of the hoof at the point and straighten the shoe also at that part. When interfering is very pronounced the inner branch of the shoe may be left free of nails. To prevent the shifting of the shoe a side-clip should be formed on the outer branch of such shoes.

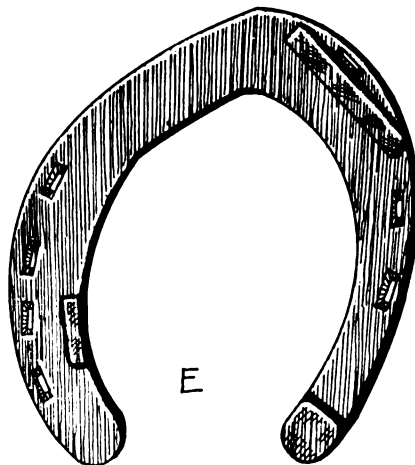
In some cases it might be found advantageous to lower the inside heel slightly. This, however, should not be done to any considerable degree, as it is far better to keep the foot in as near its true position and shape as possible.

To sum up, don't try to use one style or shape of shoe for all interfering animals. Different cases require different treatment. To successfully treat interfering, the case in hand must be carefully studied and the remedy applied as suggested by the causes.

The Horse in Scripture

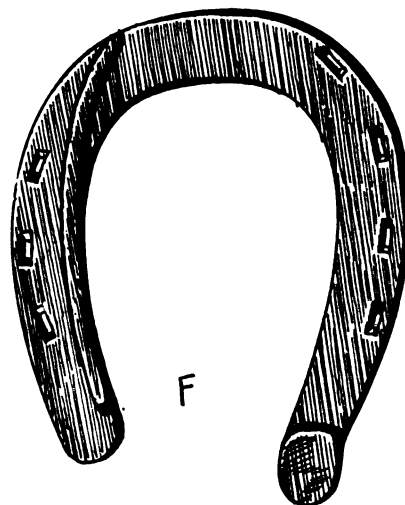
PROF. C. H. MESLER.

To man, whether as a civilized being or as a Barbarian, no animal is more useful than the horse. The beauty, grace and dignity of this creature when in a properly developed state are as marked as his utility. As an intelligent animal he ranks next in the scale to the dog, the other companion and friend of man taking into consideration his usefulness, his attractive appear-



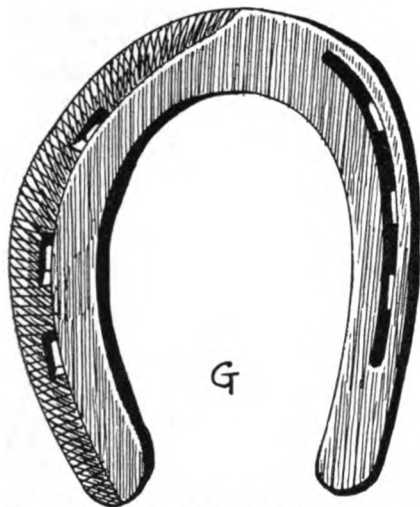
A TOE CALK IS BETWEEN THE FIRST AND SECOND NAIL HOLES

ance and his intelligence. What is known of the horse's history cannot prove unacceptable for in order to ascertain the land which can claim the proud honor of being the parent country and the birth place of this noble animal, recourse must be had to the pages of Scripture. By reference to those pages we find that although the ass was in early use



A LONG CALK ON THE INNER BRANCH CHARACTERIZES THIS SHOE

among the children of Israel, the horse was unknown to them until after the commencement of their dwelling in Egypt. Strong evidence exists for the belief that he was not brought into subjection even in that country until after their arrival. Clear it is, at all events, that Arabia, which may have supposed to be the native home of the horse, did not possess him until within a comparatively recent period, while his introduction into Greece and thence into those countries of Europe and Asia in which he is now found; either wild or domesticated may be traced with much certainty to an Egyptian source, although in the history of Abraham frequent mention is made of the ass, of the camel, of flocks and herds and of sheep and oxen, there is no allusion to the horse or indeed do we find any such until we reach the time of Joseph. In the reign of that Pharaoh in whose service Joseph was, wagons were sent by the king's commands into Canaan to bring into Egypt, Jacob and his sons, their wives and their little ones during the prevalence of the famine against which Joseph had provided. It is not recorded that those wagons were drawn by horses, but the inference that such was the fact is by no means irrational, when we remember that it was during



THIS SHOE IS ROLLED ON THE OUT-SIDE

the continuance of this famine that horses are first mentioned, having been taken by Joseph in exchange for bread from the Egyptian cultivators and cattle breeders; that on the death of Jacob his funeral was attended by both charioteer and horsemen and, lastly what is known from the writings of Homer and from the ancient sculptures showing the horse was used for purposes of draught, for some time previous to his being mounted. From this time the horse appears to have been speedily adopted for use in battle at the Exodus some fifteen hundred years before the Christian Era. The pursuing army contained six hundred chosen chariots and all the chariots of Egypt together with all the horsemen, and when the Israelites returned into Canaan they found that the horse had already been naturalized in that country, since the Canaanites were out to fight against Israel "with horses and chariots very many."

Horse Sense on Horse Shoeing

F. J. FREDERICKS.

The most necessary requirement or qualification for the man who desires to shoe horses properly is a thorough understanding and a careful study of the horse's foot in nature. Any man with any experience who will study the natural foot and nature's laws can do almost anything within reason with the horse's foot. There is, of course, a great difference in horses. Any study of the animal, no matter how little, will bring out this fact very strongly. But the fact remains that the closer the shoer follows nature and nature's laws the better success

will he have in correcting any fault in conformation and in curing any ailment or disorder.

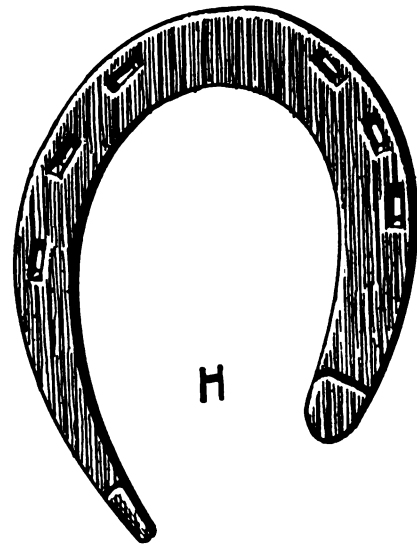
In the case of deformity it is necessary to use judgment and good common horse sense and it may at times require considerable hard study to overcome an apparently hopeless case. But the right kind of horseshoer will delight in attacking a problem of this kind, and his apparent failures in coping with the problem will simply make him more eager to bring about the correct solution.

There are few, if any set rules which the practical and sensible horseshoer can use. In fact it will seem at times as though the more experience the shoer gains the less would he be able to lay down set rules for the correct shoeing of the horse. Not only does every animal that comes into the shop present different features, but practically every foot is different than any before treated, and naturally every case must be treated individually and with careful attention to those features which distinguish it from other cases. For this reason the study of horseshoeing is an inexhaustible one and though a man be an intimate student of the art for his entire life-time, he will find cases that puzzle him.

A most important matter that many horseshoers seem to forget when they are shoeing a deformed and diseased foot and trying to bring about a healthy condition is that any defects in the foot must be corrected by degrees. Perhaps they are too anxious to bring about a speedy cure. They use shoes that are radically different in weight, size and form, and it is sometimes a wonder how the sensitive foot of the horse can stand such radical treatment. Take, for example, the application of the bar shoe in the case of a contracted foot. The frog of the narrowed foot is hard, dry and shrunken. The bar of the shoe if not applied properly will cause the frog to go still farther into the foot and thus make the unnatural condition still worse. On the other hand, if the bar is applied with very light pressure first and this pressure increased slightly at each shoeing and coupled with other approved treatments for the softening of the foot, the frog will gradually be brought back to its natural size and texture, and the foot will gradually improve in health.

And lastly, though not least by any means, must be mentioned the

support which the shoer of diseased feet must receive from the horse owner. In the hour (more or less) during which the horse is in the shoer's hands and care, the shoer cannot be expected to give the animal a treatment which will last until the next shoeing. He cannot be expected to apply the necessary daily treatment sometimes found necessary to bring about a cure. So the shoer must insist upon the help of the horse owner or his horseman. And it is well, in the treatment of a particularly difficult case, to let the horseman know that the success of your shoeing and care and treatment depends in large part on the care with which the treatment in the stable and on the road is administered. Let the horseman know



THIS IS A HIND SHOE MADE LIGHT ON THE INNER BRANCH

that stable and road treatment have much to do with the animal's health both in gait and body.

And between nature and nature's laws, a careful study of the case, the proper backing in stable and on the road and good horse sense, knowledge and experience and success must crown the efforts of the shoer.

Preparing the Foot for the Shoe

F. L. DIGERT.

In the first place, let me say that volumes can be written on the subject of preparing the foot, so it is, therefore, absolutely necessary for us to consider here one distinct phase of the subject. And the particular division that we will be the preparation of a normally healthy foot of a normal limb. For even the novice can readily understand that one must deviate from accepted

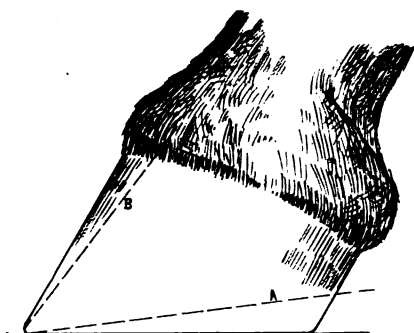


FIG. 1.—THE FOOT HAS GROWN TOO MUCH AT THE HEELS

rules when the case in hand presents extraordinary conditions.

Considerable has been said by most all shoers about "fitting the foot to the shoe," and vice versa. And I presume this particular matter will continue to interest the farrier for some time. And rightly so, as it is a most important matter and is not to be disposed of one way or the other without some thought. Of course, it is generally accepted that the shoe must be fitted to the foot, but that is by no means all. One can easily imagine what sorry-looking objects some feet would be if, when the horse was brought into the shop, the old shoes were removed and the new shoes "fitted to the foot." Foot and shoe must be fitted to each other. There can be no half-way business about it. When it is understood that the living foot is continually growing and changing, one can readily see that the bearing surface of the hoof must change. And to give the animal a proper and correct bearing it is absolutely necessary to fit the foot to the shoe and the shoe to the foot.

Now, having explained the principle of fitting to the foot, we will consider the preparation of the foot for the shoe. It is supposed that the reader understands the removal of the old shoe. Having accomplished this, the shoer should proceed to put the foot into perfect condition as far as the removal of horn will allow him. For instance, suppose the animal's foot has grown considerably at the heels while the toe has been worn down. This naturally throws the wall of the hoof forward and increases the angle of the foot. To restore the foot to the normal angle the heels are cut down, as shown by the dash line at A, thus bringing the wall of the hoof back to line B, as in figure 1.

At Fig. 2 is shown a front foot with the wall at the proper angle. It is, of course, only natural that this angle should vary in different

horses, but fifty-three degrees is generally considered correct for fore feet, while fifty-eight is a good average behind. For finding the angle of the foot an angle gauge is a very serviceable device. There are several of these on the market, and they may be obtained at a very reasonable figure.

At Fig. 3 is shown a hoof which has grown abnormally at the toe, while the heels have worn away. It will be seen that the wall has been tilted back to a lesser angle, and the point of the toe, must, therefore, be dropped. Cutting the hoof, as per the line A, will throw the wall of the hoof into line with B, the angle desired.

In a healthy condition the foot should touch the shoe equally at every point around the wall. The bearing surface is that portion be-

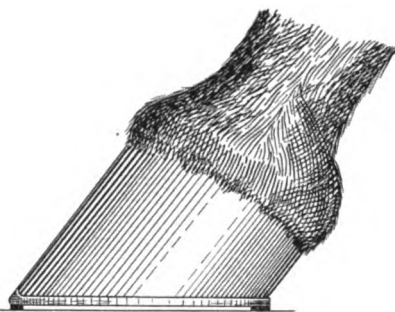


FIG. 2.—A FRONT SHOE WITH THE WALL AT THE PROPER ANGLE

tween the inner edge of the foot cavity and the outer edge of the foot wall. This includes the wall, the white line, and the margin of the sole. This surface should be perfectly horizontal. A view of how the shoe and hoof should bear is shown in Fig. 4. The heels, or branches, of the shoe usually extend slightly beyond the heels of the foot.

In the engraving at Fig. 5 is shown an incorrectly prepared foot. Here the wall of the foot at the toe has been rasped away in order to fit the foot to the shoe. This method does not correct the angle of the foot but simply allows the shoe to be attached to the hoof without any projecting horn at the toe. Needless to say this is not real shoeing but may rather be characterized as horse foot butchery.

The Anatomy of the Horse's Foot

J. C. CARTER.

The horse's foot is composed of three parts, viz., the skeleton or bony frame work; the layer of flesh which covers the frame work and

the horn called the hoof which encloses the structure.

Let us then consider the anatomy of the foot in the order in which the parts have been named above. The bones of the foot, for example, are named as follows: The os suffraginis which is commonly known as the long pastern bone; next comes the os corona, commonly called the short pastern bone; then comes the os pedis, commonly called the coffin bone, and then the os navicular, commonly called the navicular or foot bone.

The long pastern bone is about 1/3 as long as the cannon bone which is above it and which extends from the knee or hock to the fetlock. The long pastern bone reaches from the fetlock to the pastern joint where it meets with the short pastern bone.

The short pastern follows the general direction of the long pastern, reaching downward and forward and connects the long pastern with the coffin bone. The lower end of the short pastern lies within the horny structure of the hoof.

The coffin bone is similar in shape to the exterior of the hoof and when denuded of the structures that surround it, has a very rough appearance and also contains a number of small openings for the passage of blood vessels and nerves. At its upper surface and in front, is a ridge or protuberance called the pyramidal process. To this ridge is attached the extensor pedis tendon. The lower surface of the coffin bone forms the sole of the foot and is covered with the sensitive sole.

The position of the navicular bone is immediately behind the joint made by the coffin bone and the short pastern bone.

The cartilages that make up the rest of the bony foundation of the foot are situated as follows:

Just back of the sole of the foot and attached to a rough surface, is the flexor pedis perforans tendon. The surface to which it is attached

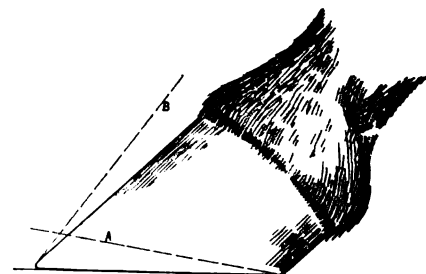


FIG. 3.—THIS SHOWS A FOOT GROWN TOO LONG AT THE TOE



is called the tendinous surface. On each side of this surface is a groove running forward and terminating in an opening called the plantar foramen, an artery and a nerve enter the bone and a vein leaves it through this opening.

On each side of the os pedis and extending backward, is a prolongation called the wing. Each wing is divided by a notch and then by a groove which runs forward on the



FIG. 4.—THE SHOE FITTED TO THE HOOF

outside of the bone. An artery lies in the notch and groove.

The navicular bone, situated as it is behind the joint of the short pastern and the coffin bone, operates in conjunction with both of them. Its extremities are attached to the wings of the coffin bone and its interior surface is covered with cartilage which forms a smooth surface for the movements of the tendon of the flexor pedis perforans muscle.

How well nature has taken care of the horse's foot in an effort to overcome the affects of concussion or jar when the foot strikes the ground may be judged from the elastic structures which in many instances show an extremely high degree of elasticity. For example, there are the lateral cartilages which are the layers of cartilages, one attached to each wing of the coffin bone and extending backward and upward until their borders may be felt under the skin above the coronet at the heels. Then, there is also the plantar cushion, or fatty frog, which is a very elastic wedge shaped pad which fills up the space between the cartilages just mentioned, the sensitive frog and the flexor pedis perforans tendon. The point of this cushion or pad extends forward to the ridge which separates the sole from the tendinous surface of the coffin bone.

Completely covering the bones and elastic structures of the foot is a blanket or envelope of sensitive

flesh and from each part of this covering, some part of the hoof is secreted or formed. This covering of sensitive flesh is known in the various parts of the foot as the coronary band, the sensitive laminae, the sensitive sole, the sensitive frog and the coronary frog band.

The coronary band is a band of tough, thick flesh about $\frac{4}{5}$ of an inch wide and extends entirely around the top of the hoof, from one bulb of the heel to the other. In front it is attached to the extensor pedis tendon and on the side, it is attached to the ligaments of the coffin bone, to the lower end of the short pastern and to the lateral cartilages. This band forms or secretes the principal part of the wall of the hoof.

The sensitive laminae or fleshy leaves cover and are firmly attached to the outer surface of the lateral cartilages. These fine, fleshy leaves dovetail into the horny laminae which they form and with them serve to fasten the wall of the hoof to the coffin bone and its cartilages.

The sensitive sole covers the bottom surface of the coffin bone and secretes the horny sole. The sensitive frog covers the lower face of the plantar cushion and from it is secreted the horny or exterior frog.

The coronary frog band is a narrow band of flesh running around just above the coronary band and is separated from it by a faint groove. This band forms the periople which is the then shiny varnish-like matter that covers the entire outer surface of the wall except when it is removed with the rasp. The periople prevents the rapid evaporation of the moisture of the horn, thus insuring its flexibility and health.

The hoof or that part of the foot which encloses and protects the other structure of the foot is generally divided into three parts, viz.,

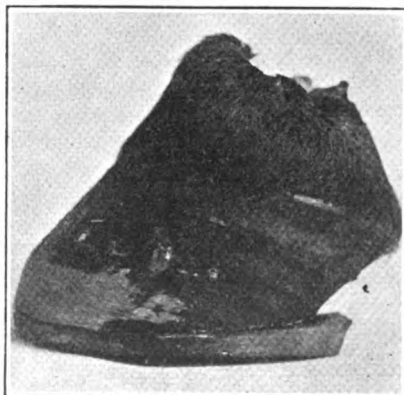


FIG. 5.—THE HOOF FITTED TO THE SHOE



THE RELATION OF THE EXTERIOR AND INTERIOR OF THE FOOT WITH CORRECT FOOT AXIS

the wall, the sole and the frog. In a healthy foot these three parts are solidly united; in disease there may be a separation of these parts as, for example, in the case of seedy toe, when the wall at the toe has the appearance of having separated from the sole.

The joining of the wall of the hoof with the sole is marked by what is known as the white line. This line is also called the guide line, as it shows where the nail should be started in shoeing. The sole covers the bottom surface of the foot except where the wall extends around the edge of the foot and where the frog fills in between the heels. The horny sole, does not in a healthy foot bear any weight except on a very narrow border which is about $\frac{1}{8}$ inch in width at the white line.

The horny frog or the frog which may be felt with the hand when examining the foot, is a wedge shaped mass of horn and fills up the triangular space between the bars of the foot. This part of the foot serves to break the jar or concussion which would otherwise be communicated to the sensitive structures of the foot and leg, and it also prevents slipping. In health, this part of the foot should be of liberal proportions, somewhat flexible and not appear as if pinched between the bars or wall of the hoof.

The Way to Figure Profits

Several readers have asked for information on figuring profits and believing that many others are interested in the same subject we publish the tables of figures as printed by the Oklahoma Association:

There is a wide-spread opinion which has been voiced at meetings of various



state associations, that many blacksmiths and wagon makers do not take the overhead expense of their business into consideration in figuring the cost prices of jobs, and as a result, they do not make the legitimate profit on their work, to which they are entitled, and should get.

The following problems that enter into our every day business have been carefully figured out by a duly appointed committee, and the cost for material are based on the market price at this time. The cost of labor is based on the length of time it takes to do the work where shops are equipped with machinery and power, and where hand tool labor is used the items of labor, especially on woodwork, should be increased in proportion to the additional length of time necessary to do the work.

The 25% over-head cost includes rent, taxes, insurance, investment, wear and tear on tools, phone, coal, power, heat, light, water, or interest on your property where you have no rent, waste, losses, expense of collections, etc. We all have these expenses to pay and 25% will not cover your total expenses, outside labor and material.

Buggy pole\$1.85
Freight25
Paint20
Labor, 2 hours60

Overhead 25%70

Profit 25%90

.....\$4.50

Buggy spoke05 1/2 c
Labor 1/2 hour 15c
Paint 05c

Overhead 25%25 1/2 c
.....06 1/2 c

Profit 25%32c
.....08c

.....40c

Oak wagon tongue\$1.40
Freight40
Paint20
Labor, 2 hours60

Overhead 25%\$2.60
......65

Profit 25%\$3.25
......81

.....\$4.06

Front bolster\$.70
Freight20
Paint10
Labor, 2 hours60

Overhead 25%\$1.60
......40

Profit 25%\$2.00
......50

.....\$2.50

Pair hind hounds\$.50
Freight20
Paint15
Labor, 2 1/2 hours75

Overhead 25%\$1.60
......40

Profit 25%\$2.00
......50

.....\$2.50

Steel tires, 450 lbs.....\$ 8.61
Freight 4.00
Labor 4.60
Bolts50

.....\$17.71

Overhead 25% 4.48

Profit 25%\$22.14
..... 5.58

.....\$27.67

Steel Tires, 300 lbs.....\$ 6.30
Freight 3.00
Labor 3.80
Bolts40

Overhead 25%\$13.50
..... 3.27

Profit 25%\$16.87
..... 4.22

.....\$22.09

Buggy shaft\$.75
Labor, 1 hour30
Paint and leathers25

Overhead 25%\$1.30
......32

Profit 25%\$1.62
......40

.....\$2.02

Wagon spoke\$.08
Paint05
Labor, 1/2 hour15

Overhead 25%\$1.30
......32

Profit 25%\$1.62
......40

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.....\$2.02

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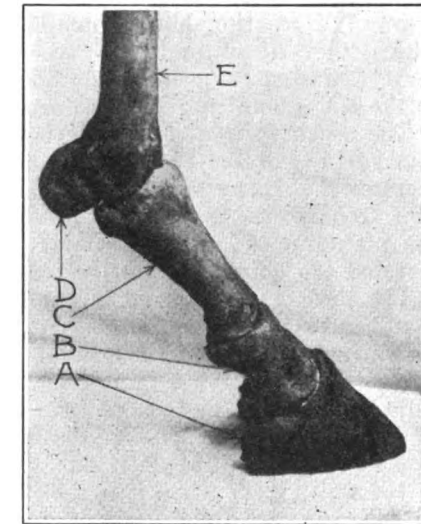
.....\$2.02

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.....\$2.02

.....\$2.02



THIS SHOWS THE BONES OF THE FOOT: A, IS THE COFFIN OR FOOT BONE; B, IS THE SHORT PASTER-ERN; C, IS THE LONG PASTER-ERN; D, IS THE SESAMOID BONE AND E, IS THE CANON BONE

Overhead 25%07

Profit 25%35

......09

......44

Wagon axle, finished.....\$1.40
Freight35
Paint15
Labor, 5 hours 1.50

Overhead 25%\$3.40
......85

Profit 25%\$4.25
.....\$1.05

.....\$5.30

Wagon fellow\$.12
Paint05
Labor, 1/2 hour15

Overhead 25%\$1.30
......32

Profit 25%\$1.62
......40

.....\$2.02

.....\$2.02

.....\$2.02

.....\$2.02

Profit 25%10

Set No. 4 shoes and toes.....\$.40
Nails05
Labor, 2 hours60

Overhead 25%\$1.05
......25

Profit 25%\$1.30
......32

.....\$1.62

Weld Shaft Iron, Smith labor.....\$.15
Helper labor15
Woodworker labor05
Bolts08
Paint05

Overhead 25%\$1.30
......32

Profit 25%\$1.62
......48

Overhead 25%\$1.30
......32

Profit 25%\$1.62
......48

.....\$1.62

Half pat. axles, 1 1/4 in.....\$2.00
Freight40
Labor 8.25
Paint15

Overhead 25%\$5.80
.....1.45

Profit 25%\$7.25
.....1.81

.....\$9.06

New Rim, 1 in.\$.34
Freight15
Woodworker labor50
Paint15

Overhead 25%\$1.14
......28

Profit 25%\$1.42
......35

.....\$1.77

Set tire extra\$.75

.....\$2.52

Hickory Pole, 3x5\$2.50
Freight60
Labor75
Paint25

Overhead 25%\$4.10
.....1.08

Profit 25%\$5.18
.....1.29

.....\$6.42

Concord Long Arm Axles, 1 3/4x9, 166 lbs. \$9.13

Freight 1.35

Labor 4.30

.....\$14.78

Overhead 25%\$3.69

Profit 25%\$18.47

.....\$4.62

.....\$23.08

Rim, 1 5/8 in.\$.75
Freight35
Woodwork labor75
Paint25

Overhead 25%\$2.10
......42

Profit 25%\$2.52
......63

.....\$3.15

Set tire extra\$1.00

.....\$4.15

Set 7-8 in. Repair Tired Wheels, cost

Wheels\$1.80

Freight and dray 1.55

Woodwork labor75

Paint, 1 coat75

Overhead 25%\$9.85

Profit 25%\$12.81

.....\$15.89



1 in. Shackle clip	\$.15
Labor	.10
Overhead 25%	.06
Profit 25%	.81
	.08
	\$.39
Out Down Farm Wagon Wheels, 1 Set	
Fellows, 1 5-8x2 1-4, cost sawed fel-	
lows	\$2.25
Woodwork, 8 hours	2.40
Freight	.65
Smith and helper labor	1.65
Paint	.50
	\$7.45
Overhead 25%	1.86
Profit 25%	\$9.31
	\$2.33
	\$11.64
1 Set Special Select Wheels, size, 1 1-4 in.	\$12.75
Freight and dray	2.48
Woodwork labor	.60
Paint (2 coats)	1.50
	\$17.33
Overhead 25%	4.33
Profit 25%	\$21.66
	5.41
	\$26.07
Short Arm Concord Axles, 1 3-8 in.	
Freight	\$.50
Labor	3.50
Paint	.15
	\$8.05
Overhead 25%	2.01
Profit 25%	\$10.05
	.51
	\$12.57
Out Down Wagon and Apply 3x5-8 Tires	
and Rims. Tires, 358 lbs.	\$7.09
Rims	7.60
Freight	4.00
Labor, woodwork	8.00
Labor, Smith	2.75
Paint	.50
	\$24.94
Overhead 25%	6.23
Profit 25%	\$31.17
	7.79
	\$38.96
Buggy cross bar	\$.25
Woodwork labor	.15
Smith labor	.25
Paint	.10
Bolts	.08
	\$.83
Overhead 25%	.21
Profit 25%	\$1.04
	.26
	\$1.30
Buggy Side Panel, Poplar	\$.65
Woodwork labor	.60
Helper labor	.25
Repair seat rods and bolts	.25
Paint, 1 coat	.25
	\$2.00
Overhead 25%	.50
Profit 25%	\$2.50
	.62
	\$3.12
Buggy and Panel, basis as above	\$1.50
Buggy reach, straight	.15
Helper labor	.25
Woodwork labor	.20
Bolts	.10
Paint	.10
	.80
Overhead 25%	.20
Profit 25%	\$1.00
	.25
	\$1.25

Good Methods of Making Springs

CLARENCE W. BOLTON,
"Work"—England.

Springs can be classified under the following titles, and although there are many other types, they are all more or less modifications of the ones illustrated.

Referring to Fig. 1, A shows an ordinary parallel compression spring, and B, an ordinary parallel tension spring. These are the types of springs most commonly used in the mechanical construction, and are employed to exert a force in the direction indicated by the arrows, at C, is a double concave volute spring, more commonly known as a "chair spring" because of its extensive use by upholsterers to give the resilience to the seats of furniture; at D, is a double convex volute, an example of an "open" tension spring; and, at E, a volute spring for compression. Other springs, which will not be dealt within this article, are spiral watch springs and laminated springs, the latter consisting of a series of flat of spring steel clamped together, the same as used on wagons and motor-cars.

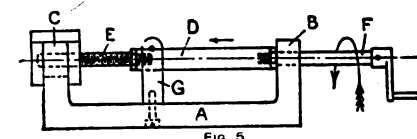
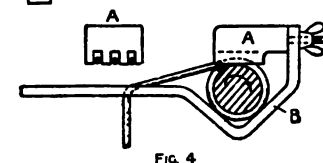
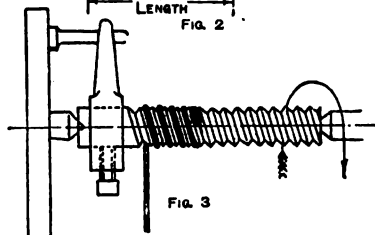
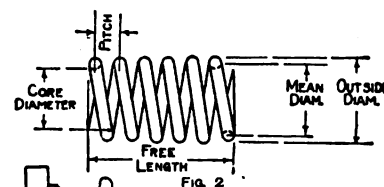
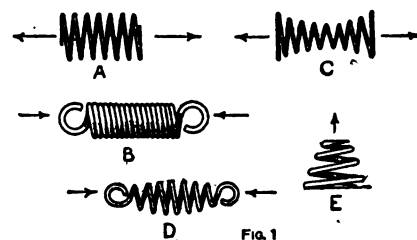
The types A and B are known as helical springs, whilst those of the watch-spring variety are called spiral springs. It is, however, quite in order to call the springs A and B both helicals and spirals, and a watch spring both a spiral and volute spring; but if it is made a rule to classify them as follows, mistakes will be more easily avoided: A and B, helical springs; E, volute spring, the term "spiral" spring being used for the watch-spring variety.

The machine used for winding a spring is a screw-cutting lathe, that is, of course, where a special spring-coiling machine is not available; but the latter is used only where springs are manufactured in enormous quantities, and the action only of this machine will be dealt with.

Machine Spring-Coiling

The feature of spring-coiling machines is the absence of a "core" or arbor, as the wire, instead of being formed from the inside, is formed from the exterior by means of guide rolls. The wire is taken to the machine, wound on a wooden drum for convenience in handling, and fixed to the machine in such a manner that it is free to revolve about its axis. The wire then passes between two grooved rolls; the bottom one is driven by gearing, and drives the

top one by frictional contact. These rolls act as the feed, feeding the wire through a tube or nozzle on to a series of rolls. The latter are in reality V-grooved pulleys, rolls being merely the technical term given to pulleys when used for the particular purpose. The number of rolls used is usually four which are arranged template-way like the four extremities of an X, therefore forming four points in the circumference



FIGS. 1-5.—SHOWING TYPES OF SPRINGS, SPRING TERMS AND WINDING DEVICES

of a circle scribed about the centre of the X. The wire after leaving the nozzle is deflected by the first roll, which gives it a radii, and the following rolls merely prevent it from leaving its appointed path. In addition to the rolls being arranged in a circle, they are also arranged in a spiral; that is, the first roll is not in the same plane as the last roll, but is set off side a distance equal to a pitch of the spring. The two intermediate rolls are set in a true spiral.

To obtain a spring of larger diameter, the rolls have to be adjusted away from the common centre. To obtain a spring a greater pitch, the



rolls have to be adjusted farther out sidewise.

It will now be perfectly obvious that a spring is not limited in length until the coil of wire is finished. This, however, is not the case in all spring-coiling machines, as other machines work on different principles. For example, they can be set to cut off, say, six inch spring automatically until the end of the wire is reached. The rolls on some machines are arranged all in the same plane in lieu of spirally, the pitch being given by a reciprocating guide.

Before proceeding farther, get accustomed to the various terms applied to a spring (see Fig. 2.) If using a coiling machine it is necessary to speak of the "outside diameter" of a spring, because it is formed from the outside; but if winding it on an arbor by means of the lathes, the "inside diameter", or more correctly, the "core diameter", is spoken of. The "pitch" of a spring is the distance from the centre of one coil to the centre of the next coil, which represents the distance the wire has travelled longitudinally for one complete revolution of the arbor. The "free length" is the actual length of the spring when "at rest". The working length" when in position, but at its maximum length, and the "compressed length" when in position, but at its minimum length. The "mean diameter" is, as its name implies, the "average diameter", and is only used to find the "developed length", which is the length of the spring when developed or opened out; hence the actual length of the wire required to make the spring, given that D is equal to the mean diameter and N equal to the number of coils, the formula is $D \times 3.14 \times N = \text{developed length}$. When calculating for the length of wire always make an allowance for fixing to the mandrel at the one end, and sufficient to hold it at the other end when winding the last coil.

Winding a Spring

As previously mentioned the practical method of winding a spring is on an arbor in the lathe, although they can be wound on drilling machines and even brace drills when nothing else has been available. To wind a spring in this manner, the direction of rotation of the lathe spindle is reversed, so that it revolves over and away from the operator. A tension device is then fixed to the cross slide. A device with three rolls is generally used, similar to the device shown in Fig 8, but

the framework consisting of an angle bracket, so that it can be bolted down to the cross slide. This arrangement keeps the tension on the wire, and simultaneously removes any kinds which may be present in the wire as it comes from the coil. The coil of wire is next hung in a suitable position, so that the wire can be led off easily and straight; also there is a right and a wrong way to take the wire off

after a spring is wound is a reduction of the pitch, which is often as much as 1/16-inch in a 3/8-inch pitch spring. So that if it is required to wind a 3/8-inch pitch spring it would be necessary to gear up for a 7/16-inch pitch spring. It is only when winding a "compression spring" that the pitch is considered: or rather, it should be said, when winding an "open spring."

To wind an "open spring" choose the screw-cutting lathe, reverse its motion, fix the tension device on the cross slide, and gear up just as for cutting a screw thread of the same pitch, making the allowance, before mentioned, for shrinkage of the spring's pitch. The arbor that the spring is wound upon is an ordinary parallel arbor, square-centered at each end, and has a hole drilled through transversely or at right angles to its length about three inches from the end, so as to permit the lathe carrier to be fixed. The purpose of the hole is to thread the wire through, so that the spring can be started (see Figure 9).

To wind a "close spring", disconnect the carriage from the lead screw and feed along by hand. The first spring the amateur makes of this description is usually not very commendable; but good specimens are soon forthcoming after a little practice.

Some Devices

It is not taken for granted that every amateur who wishes to make springs is in possession of a lathe, especially a screw-cutting lathe; so one or two practical devices all operated by the hand will be described. But first of all it will be presumed that a plain, not a screw-cutting, lathe is available, and the amateur requires a compression spring, which does not require to be of any particular size providing that it is strong enough to perform its duty. Approximate the size it ought to be and what pitch, then search the screw box for the screw nearest that diameter and pitch; square-centre it, fix on the carrier, and drill a hole through the screw (see Fig. 3). It will be noticed the lathe has not to be reversed, but the wire fed from right to left, or in other words, from tailstock to headstock. This method of feeding the wire is not the ideal; the best method is to reverse the lathe. Suppose only a plain lathe is available, it is desired to wind an open spring of a given diameter and a given pitch. This can be done by making a suitable arbor and a pitch guide as in Fig. 4. This consists of

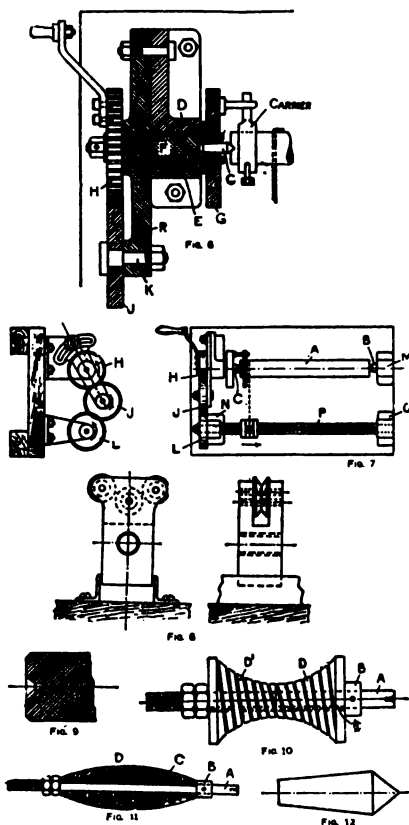


FIG. 6-12.—SHOWING WINDING DEVICES, TENSION DEVICE AND MANDRELS FOR SPRINGS

the coil; and the correct way, although found only by practice, is said to preserve the grain of the metal. Hold the coil in the left hand, and see that the machine in pulling the wire off the coil revolved the coil in the same direction as the machine revolves itself.

Before a spring can be wound the following particulars are required: (1) core diameter, (2) pitch, (3) developed length, and (4) free length. Two allowances have to be made owing to the elastic nature of the wire. After a spring has been wound it is found to measure 1/32-inch greater in the core diameter than the diameter of the arbor upon which it was wound. This difference is compensated for by reducing the diameter of the arbor by 1/32-inch. The other difference that takes place



a block A with three grooves filed therein to act as spacers, the distance apart being equal to the required pitch plus the allowance for shrinkage. This block is clamped to a shaped iron strip B, and when the wire is given a start it feeds autotomatically.

A neat little device to rig up when there is no lathe available is the one shown in Fig. 5. It consists of a U-plate A drilled at the end B to form a bearing, the end C being a vise arrangement to facilitate the gripping of a hexagonal nut. A different-diameter mandrel D or arbor is required for each diameter of spring, and a different pitch of screw, E is required for each pitch of spring, so that it will be obvious that the screws E can be any diameter so long as they are the requisite pitch. Standard screws, such as Whitworth or the finer-thread screws, will be found to vary in pitch, as they vary in diameter, which means that the screws E will all be of different diameters; and as the mandrels will be of different diameters, the diameter of the shaft and handle F will remain constant, because the same one is used in each case.

The connection between the screw and mandrel and the connection between the mandrel and handle shaft, must be interchangeable for all sizes, and the method outlined will be found to serve its purpose well. All the mandrels are tapped at each end, at the handle shaft end, the most convenient size to suit. At the opposite end it must be tapped to suit the smallest-diameter screw, and all larger screws must be turned down and threaded to the same size and pitch as the smallest screw. The whole range of mandrels and screws will, therefore correspond and any diameter mandrel can be coupled up with any diameter screw. A lock-nut is provided to prevent the screw releasing when tension is put on the wire. G is a piece of plate screwed to the U-plate, and has a hole drilled, or better still, a V-groove pulley to guide the wire.

Spring-Winding Machine

For the smith who wishes to develop a little spring-making business, the following particulars of a hand spring-winding machine will be useful. First purchase a set of gears belonging to an old screw-cutting lathe, also a lead screw from a similar machine. These could be purchased very cheaply, and are parts the amateur will wisely leave alone in attempting to make. The

working of the machine will be clearly understood from Figs. 6 and 7. A is the arbor which is supported between the dead centre B and running centre C. The spindle and arbor driven direct, revolution for revolution of the handle lever and the lead screw is connected up with gears to give the requisite traverse which gives the pitch. As regards constructional details, the base of

stationary. This dead centre must be in true alignment with the head. The two bearings N and O, with the lead screw P are put in position, and must be in true alignment with the spindle and arbor.

The wire guide and tension device is illustrated in Fig. 8. It is tapped to suit the lead screw P, and contains three V-grooved pulleys. It is, of course, traversed by the lead



THE STAIRWAY GATES IN THE CHURCH AT BEVERLY MINSTER

the machine consists of a square or, rather, rectangular piece of wood stiffened by two stout battens. The first part to be mounted on the base is the head (see Fig. 6). This consists of a bearing D bored out to receive a sleeve E, which is secured to the bearing with small screws. Fitting inside the sleeve is the spindles F, which supports the face-plate G at one end and at the same end is bored and reamed taper to suit the centre C a driving fit. The spindle is necked down at the other end to suit the bore of a gear wheel H. It has a keyway for a Woodruff key, to prevent the gear from turning independently of the spindle, and is screwed at the end to receive a nut and washer, which keep the gear in position. A pin is driven through the nut and spindle to prevent the nut slacking back, and a handle is screwed to the gear to facilitate turning the spindle. The purpose of the sleeve is to support a swinging arm R, which carries the idler gear J by means of a stud K. The idler wheel is merely to compensate for the variation in diameter of the change wheels L. The head is fixed in position and the dead centre B, which consists of a hardened centre similar to C, but is fixed on a bracket M, so that it is

screw, and two strips of angle iron prevent it from rotating.

Irregular-Shaped Springs

The winding of irregular-shaped springs will now be dealt with.

It will be apparent that if the springs C (Fig. 1) and D (Fig. 1) were wound on solid cores, that the cores could not be withdrawn unless the spring was distorted to such an extent as to render it useless. There is, therefore only one alternative, and that is to make the cores collapsible. For the spring C the core is made in two distinct halves. (See Fig. 10). A spindle A is turned to size, being previously square-centred, and a collar B, which is a fit on the spindle, is pinned in position. A key C is screwed to the spindle, and a keyway put in the two halves of the core, D and D, to suit. The spindle A is next screwed, and two lock-nuts hold the device together. The whole arrangement is mounted between the centres of the lathe, turned to the desired shape and a spiral groove cut, very shallow and of the V-form. The spring is wound by hand traverse in the usual manner. When wound the nuts are slacked back. One half of the core marked D is removed, and the spring is free to be removed.

In case of the spring D (Fig. 1



it is a very different matter. The two ends are smaller than the middle therefore the core cannot be removed through the ends, but must be built up of segments, of a less thickness than the space between any two coils, so that on the spindle A, (Fig. 11), being withdrawn, the segments fall through the spaces between the coils. As regards the construction, A is the spindle, B a collar pinned to the spindle, C a key to ensure alignment, and D the segments which form the core. They resemble conical washers, and are all numbered on one side only, so that they can always be assembled in the proper order and the same way on. Two lock nuts secure them in position, and they are then turned and spirally grooved when assembled. The springs are wound in the usual manner and by hand traverse.

The volute spring is made on an arbor similar to Fig. 10, the two halves being straight comes in place of the curved ones shown. The finished spring, therefore somewhat resembles C (Fig. 1), and is afterwards cut in two. Two springs are therefore, made at one setting. If, however, one spring only was desired, the lathe could be stopped at half traverse.

The winding of the springs being complete, the next and last process is tempering the spring to give it the necessary elasticity. For this process a small furnace is necessary to obtain the requisite temperature. (1) Leave the spring in the furnace until it assumes a blood-red color. (2) Remove from the furnace with tongs, and dip for ten seconds in a bath of cold oil (3) Put the spring back in the furnace, and blaze off the oil. (4) Dip into the oil bath until cool. The finished spring, if properly done, will be a pleasing blue color, and the temper should be perfect.

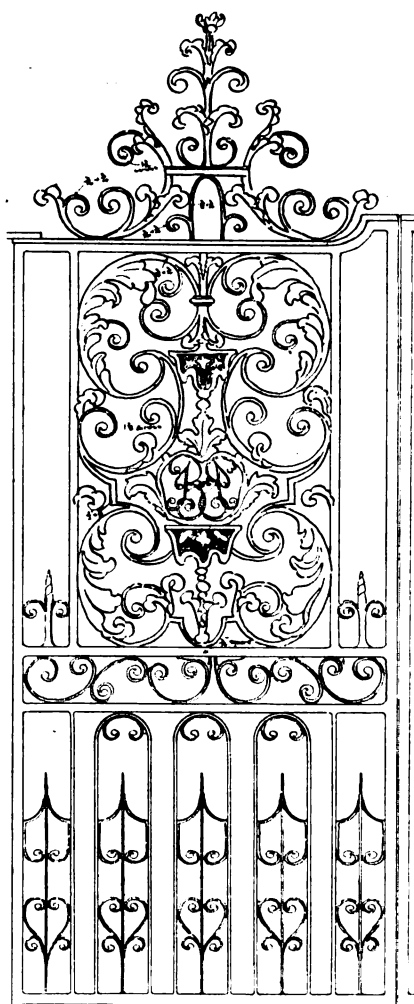
A Set of Wrought Iron Gates in an English Church

J. Y. DUNLOP

These gates are located in Beverley, Minster. From the church records it is evident that these gates were for another part of the church building, and at first had side grilles to which the present gates are hung. Now the gates are hung directly on the masonry, with an extended hinge at the top to keep the gates clear of the moulded base at the bottom.

The outer frame of both halves of

these gates are made of one-inch square iron, while the shaped rail at the top has a flat bar, two inches by $\frac{3}{8}$ -inch riveted to the top. The design of the gates is very simple. Two, one inch by $\frac{7}{8}$ -inch rails making a six-inch space near the middle of the gates, while the addition of two vertical rods above mark



DETAIL OF THE ENGLISH CHURCH GATE

off a center panel in the upper portion with a six-inch space on each side. The lower portion of the gate is filled in with one inch by $\frac{3}{8}$ -inch bars which in the side portion are welded to the frame of the gates, but those in the middle are riveted through the bottom rail and also at the top. It will be noticed in the line engraving of the gates, that the middle scroll filled in. This lower portion of the gates is a very good example of how space may be filled in with forms of simple designs.

It is in the upper portion of the gates, with their elaborate scrolls and leaf work that the smith has shown his skill. It will be noted, in the upper center panel of the gates

a monogram is worked into the design in a very neat manner, and the use of a rather peculiar form of decorations will also be noted in the two specimens of relief work, one which appears directly below the monogram, and the other just above the center of the panel.

The photographic reproduction of the gates shows only the top portion, but the interested reader can get an excellent idea of what the lower panels are like, from the line engraving.

The Few Drops that Make the Difference

In the making of a certain table sauce the story is told of a score of men preparing the ingredients. When these are ready they are mixed in a huge vat. Here the men work stirring and mixing until, at a certain stage in the process of making two trusted employees of the works bring a pail of mysterious something and add a certain quantity of this material. Again the mass is stirred and mixed, until the proprietor pours a few drops of a certain very mysterious something into the mixture. THEN and not until then is the mixture ready for the bottles in which it is sold. It is said that up to the point when the proprietor himself pours in the drops of liquid from a bottle which is always carefully locked in a safe, the sauce does not differ very much from any other. But the addition of a few mysterious drops makes all the difference between the one best sauce and the scores of imitations.

And so it is in smithing. When you come right down to actual work and material, the great majority of smiths are all about on the same footing. They can weld and forge, they can all use the same good material and can all have the same tools to work with. So in order to stand out different than the great mass we must get in a "few drops" of something that the others don't put in. What are these drops?

They may be superior service. They may be attention to the little things that make the difference between careless and careful work. They may be the extras that are unexpected, but that surprise and please the customer. They may be the difference between a thorough understanding of the trade and business and a knowledge that "will do". They may be that intangible something is sometimes called prestige, or may be the personality, the



geniality or the thoroughness of the proprietor. But whatever that "few drops" of something different may be, it is important that the smith have it so as to make his shop, his work and his business stand out from the crowd.

Thoughts on Timely Topics

By THORNTON.

Caustic Censure and Cheery Comment

IF YOU DON'T supply the spark plugs for the motor and the "gas" for the tank, remember there's a fellow down the street with a smile and an itching palm who will do it.

"GIVE THE HORSE A CHANCE" by Dr. McDonough in the June number had the right ring. It sounds like good plain horse-sense—something that seems to be getting scarcer and less frequent as the years go on. Like the Doctor, I would like to know what other practical men think of the idea. I wonder what the shoe manufacturers' thinks of Dr. McDonough's idea. Come on readers, write in to the Editor and express yourself on the McDonough Five-Calk Shoe.

"SHALL I EXTEND CREDIT?" asks one smith who evidently takes this department for a short course in business practice, and which question, without some explanation of conditions, is about as sensible as inquiring about the price of property in New York City or the price of horses. It all depends. If a smith can do a cash business he displays about as much common sense as a dog barking at the moon, when he opens any charge accounts. Credit is the thing that keeps the business world going. Abuse of credit puts many a business on the junk heap. If a smith must do a credit business, the only thing to do is to run it right. Trusting every Tom, Dick and Dead Beat will soon put any business on the dump no matter how prosperous. You can no more run your business on the money outstanding than you can build your house on the foundation under your neighbor's residence. If credit is extended to customers, don't pass it out like free samples at the fair. Make your customer show that he is worthy of credit, if you don't know him. If you do know him and you know he's N. G.—don't give him credit under any circumstances. It's better to have your work and stock in your shop than in the pocket of a "Dead Beat," where you can't get at it.

The Smith in The Daily News

Odd Mention of Anvil Ringers and Knights of the Forge in the News of the Day.

J. J. W. MORROW

BRINGS BACK SPEEDER

"Silent Brigado" had been relegated to the ash heap a hopeless proposition as a race horse when he suddenly and mysteriously went to the bad after breezing a mile in 2:10 as a two-year-old back in 1910. After that performance he couldn't even make a decent showing in a race.

He changed hands several times and each time at a reduced price, his various owners finally giving him up as a quitter till J. J. W. Morrow, Newcastle, Pa., a blacksmith, bought him for a song.

Morrow studied the horse's hoofs and found they concealed corns, abscesses and various other things which made it small wonder he wasn't doing any stepping on the tracks. For months he worked to fix up those feet and now Silent Brigade is a speeder again.

He won the first heat and took second money in the 2:17 trot at Cranwood track, Cleveland, in the Lake Erie circuit.

FRANK A. OTT FIFTY

YEARS BEHIND ANVIL

Frank A. Ott, of Batavia, N. Y., the veteran blacksmith and horseshoer, celebrated on June 19th, the fiftieth anniversary of his employment at the anvil. On Monday, June 19th, 1866, he entered his father's shop at Ohlungen, Canton Hagenau, Alsace. His father and grandfather were both blacksmiths and horseshoers and his grandfather was a member of Napoleon's body guard and shod the "Little Corporal's" horses for five years.

In 1872, Frank A. Ott went to work at his trade in Paris, France, and in 1875 returned to Germany to serve three years in the German army. In 1880 he came to America and set up a blacksmith shop at Higginsville, N. Y., and the following year came to Batavia, where he built his present shop, the largest in the city. He served several terms as trustee under the village government.

When vice-president of the state association four years ago Mr. Ott started the movement in the association which led to the establishment of a school of horseshoeing at the State College of Agriculture at Cornell University.

JOSIAH COLLINS, AT AGE OF

NINETY SHOES HORSE

Josiah Collins of Parnell, Mo., celebrated his ninetieth birthday recently, and to keep a vow that he had frequently made, he went to the blacksmith shop on his anniversary and shod a horse.

Mr. Collins, who is a native of Ohio, began his trade when he was nineteen years old. He has followed the blacksmithing business all his life and has often declared that, if he lived, he would shoe a horse or mule on his ninetieth birthday, no matter how unruly the animal might be. He kept his vow and was much pleased again to perform the familiar task.

PATRIOTIC ANVIL RINGERS JOIN TROOPS FOR MEXICAN BORDER

Blacksmiths' and Horseshoers' were quick to answer the call for men of their profession in the army. Horses must be shod and wagons and trucks must be repaired and blacksmiths and horseshoers must do the work. And when the call was issued for anvil ringers, no body of men could have answered sooner nor proven their willingness more convincingly. In fact, so loyal and patriotic have the knights of the anvil answered that here are smith shops with entire new forces and many more are doing with fewer hands. Hail to the loyalty and patriotism of the country's blacksmiths and horseshoers in the service of Uncle Sam.

BLACKSMITH FORGES PAPER

INSTEAD OF IRON

Not satisfied with the lesson taught by a short stay in the county jail for the first offense, a Utah blacksmith upon his release promptly started plying his trade of forging again, but unwisely made the mistake of forging checks instead of iron. Evidently his habit of forging is so strong that he cannot break it even when he happens to have a blank check in his hand. It is unnecessary to say that a wise smith will confine his efforts to the forging of metal and thus save the temper of the police and the banks.

E. J. DRINNING, FATHER

OF TWENTY-ONE CHILDREN

The birth of Thelma, Velma and Elmer Drinning of Dallas, Texas, is said to raise the number of Papa Drinning's children to twenty-one. The present Mrs. Drinning and wife of the triplets is Drinning's fifth wife. She is 28 while he is 53. The triplets was born in a home where comfort had been arranged for only one. Dallas folk have, however, furnished clothing for the three new citizens and so the paths of the little ones have been cleared as though by the wand of a fairy god-mother.

KANSAS CITY BLACKSMITH PAYS

\$100 A POUND FOR BRASS

A mutual friend (?) introduced a certain K. C. blacksmith to a chap who posed as a jeweler who has disposed of his jewelry stock with the exception of about nine pounds of gold melted into small coin-shaped pieces which he carried in a shoe box lined with cotton. The "jeweler" was willing to sell the gold for \$100 a pound, he said: "you take these samples to a jeweler and see what he says," producing several discs like those in the box.

The smith went to a K. C. jeweler, who said the samples were pure gold, worth \$247.20 a pound. Stopping at the bank to get \$900 in gold money, the smith counted it out in the hand of the stranger who also took back the samples.

That night the smith carried the treasure home with him.

"I guess I'll buy a motor car with the \$900 I made," he said to his brother.

Misgivings overtook the smith the next day. He put the box under his arm and went hatless to his Kansas City jeweler friend. The jeweler began his examination, then looked up with a start.

"These are brass," he said.

The excited blacksmith soon learned he had paid \$900 for a shoe box filled with the sort of brass checks used to set an electric piano to churning. They had been gilded over.



Carriage Repairin' vs. Automobile Engineering

W. O. B.

PART I.

Carriage Repairin'

William Runk the village smith was a thrifty honest chap. Did the shoeing and the fixing in the town of Brasher's Gap. Long he labored at his anvil forging shoe or hook or chain, fixing wagons and repairing for the bread of life to gain. "Labor's worthy of its hire an' must get what's justly due." He would say as he presented bill for wheel or shaft or shoe. He did work of all description from the forging of a shoe to the fixing of a carriage and the painting of it too. But with all his carriage fitting was his special, so to say, and he had a reputation that brought trade from far away.

One day came Ol' Voluey Thurber with a carriage held with rope. "Will," said Vol as down he scrambled, "think it's worth a cake o' soap?" "Wall" said Runk, "I'll feel'er over, sure she ain't so much on looks, mebber tho' she'll do fer meetin' when fer style y' don't care shoos. Looks es tho' her wheels are rotted, tires too are on the bink. And her shafts are hardly suited for t' chuck into the sink. Top is gone an' so's her dash-board, sill is powdery, weak and sick—seat is mothy, back is busted and her floor ain't just right slick. Better let me do some fixing and assortin' of this junk, 'fore you venture on the road, Vol," was the verdict of Will Runk.

When Will Runk sent out his statement for repairin' Thurber's rig, he took care to charge each item—everything both small or big. All the wood he used for fixin' up the sill and seat and floor, all the screws and bolts and small parts—must o' been a score or more. He put down each piece of iron, square of cloth an' length of string; every nail and hook and eyelet, bit o' paint, each iron ring. Then, of course, he charged for labor and included all his time—and for "lookin' an' a-peekin'" he charged Thurler just a dime.

(Concluded in September).



Heats, Sparks, Welds

It isn't the keen smith who cuts prices.

Keep the smile a-workin' hard. Many a persistent smile has downed many a grouch.

Suppose you do work hard—if you don't get the profit you should get what's the answer?

That chap who has a good business hustling for him, no doubt once hustled for the business.

'Tis better to prepare than repair, say we. And if the preparing is of the right sort no repairing will be necessary.

Will wonders never cease? A wireless-telegraph organ that transmits music by wireless has been patented by a Canadian.

Doing work at cost in the slack season or at any time, "simply to keep the shop busy," simply keeps the shop busy at a loss.

Speaking of town names how do you like the following?: Two Beers, Texas; Bird-in-Hand, Pa., not to mention Brandy, N. Y.

Quality is the best partner Price ever had. The two make a combination that can't be beaten when a re-order is expected.

Hard work alone never brought success to anyone's door. Work with brain and muscle is the combination that opens the door to success.

Powdered coal is now being used as a fuel on railway locomotives of special type. The pulverized fuel is said to effect a saving of from 15 to 25 per cent in fuel alone.

When the smooth-tongued chap with the get-rich-over-night-scheme tells you all about it in his quiet way—listen if you want to—but, keep a tight grip on your loose change.

"'Bout everything goin' up these days 'cept prices for blacksmith work" said Tom Tardy the other day. Friend Tardy was never good at raising anything but trouble for himself.

Smithing costs have advanced all along the line—do your prices show that advance or do your customers think you are still paying the same old prices for all your supplies?

It's not the source of knowledge that really counts. It's the knowledge itself. A worth while hint from a ten-year-old may enable a veteran to solve the problems of years. It's the knowledge not the source that counts.

What you think your profit should be doesn't make it an actuality. Even if your books show a snug sum in the profit column, that doesn't mean anything unless you can count out that sum in actual coin of the realm on hand or in bank.

A census report tells of the decrease in motorcycle manufacturing plants from 122 to 94, but of an increase of from twelve million to twenty-five million dollars in the value of the product. During 1914, 64,000 motorcycles were built.

Some men are so busy they accomplish nothing while others with no apparent effort seem to accomplish a tremendous amount. Why? It's the difference between fussing and working—between wrongly directed effort and rightly directed effort—between the loose and the tight pulleys.

It isn't the craft that's at fault Mr. Kicker. If trade is poor—advertise and go after business. If prices are low—raise 'em to where they should be. If the work is hard—put in power. If the location is poor—move. But don't blame the craft—it's all right and getting better every day if you will only keep step with its advancement.

The ideas that have been born and have rotted, rusted and died in the bed of their birth never did anyone any good. The worth of an idea is calculated by its work for humanity. To work for humanity an idea must be given to the world. You are hurting yourself and depriving the world of some good by not telling what you know about the things you specialize in.

Don't try to forge the boy's future as you do that of iron, by pounding and beating. The boy's character is just as plastic as that of the white hot metal and can by proper means be formed just as easily and surely. But the boy is a thinking, living, breathing animal, not a dead lump of earth. He needs careful handling, a kindly word, and a steady guiding hand. Good smith work is a fine shop product, but good boys are beyond compare as a product of both home and shop.

You are not expected to agree with everything that is said in these columns. But when you do not agree you ARE expected to say so and tell your side of the matter. You are just as much entitled to your view-point as the other fellow is, so why hesitate to tell your side of the story. It is only by a free and easy discussion of the matter that we can learn, and grow, and expand. You can help yourself and others by writing for "Our Journal" and discussing the subjects that are mentioned each month.

"The absolute impossibility of success made it possible" said dauntless Colonel Mosby in speaking of one of his exploits in the Civil War. And in the present World War one is continually reminded of Mosby's sentence. The jibes and jests of yesterday become the possibilities of today. What a message for those faint hearted mortals who are continually complaining of the impassible obstacles in their path! What a preachment on "The chap who does the things he didn't know couldn't be done"! Present time world happenings make the present day mortal feel that nothing is impossible.

"A good judge of a bad horse" is the boast a certain blacksmith makes, while a retired tradesman of the town admits that he himself is a "very poor judge of a good horse."

One day recently the retired tradesman took an animal, that had somewhat the appearance of a horse, down to the smithy to be shod.

"How many shoes shall I put on im?" Asked the anvil ringer looking at the sorry-looking steed.

"Four of course," said the tradesman. "If you think he's worth it."

The smith put two shoes in place and then stopped.

"Mind you," he said warningly to the proud owner of the equine curiosity. "I ain't sayin' yer hoss ain't worth a couple more shoes, but I'm purty bloomin' sartin as 'e's got as many now as 'e can carry away."



Our Honor Roll

AND STILL THEY COME

More and more readers are taking advantage of "Our Honor Roll" every month and it is becoming more difficult each month to find a place on the list of Honor Subscribers. If you do not know what a saving you can make by taking advantage of Our Long-Time Rates look over the table of rates and see just how can save money and at the same time insure your subscription account. Sharpen your pencil and get down to actual figures and then get your name on this list of Readers who are paid up well in advance.

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C. Fransen, New York.....	Nov., 1910	E. Clark, Mo.....	May, 1910
J. Delane, Nebr.....	Nov., 1910	A. Furnier, N. Y.....	May, 1910
J. H. Staase, Mo.....	Nov., 1910	H. J. Eupracht, N. Y.....	May, 1910
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		S. Stevenson, Kansas.....	May, 1910
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Fundamentals of Lathe Practice—Chucking

JAMES STEELMAN.

It is important to get work on the lathe right. There are various devices used to retain the work securely in place. Such devices are *chucks*; and the process of arranging a chuck and the work properly is called *chucking*.

Perhaps the simplest form of chucking is the procedure where work is gotten ready for turning it between a dead center in the tail stock and a live center in the head stock. A *dog* or other suitable device is secured to the driving plate in such way that, when spindle, driving plate and live center all rotate, the work will be carried round by a piece projecting from the driving plate. When the lathe is first started, this projecting piece should bear against the work; otherwise it may strike the work a more or less sharp blow.

The work itself should be gotten ready for chucking between centers by having suitable conical depressions (center holes) made in it to fit the centers in the head and tail stocks. After they have been properly placed and formed, the work is put in place.

The tail stock must be brought up fairly close to the position the tail end of the work will occupy when on the lathe. If necessary, lock the tail stock in position. The center may then be withdrawn in the stock

in the tail stock. The center is now run forward into the depression prepared for it and locked in place. The work is then run between the two centers.

To get the work ready for this chucking operation, it is necessary first to locate the precise points where the conical depressions are to be placed. If the work is a straight bar, circular in section, what is usually wanted is the location of the center of the circle at the two ends. There are special tools to do such work; but the lathe operator may have to rely on ordinary instruments close at hand. Perhaps the most useful thing to have in mind is that the center of a circle is on the longest cross measurement—that is, it is on the diameter. Lay a metal rule across one of the circular faces and shift it until you are sure you have a diameter—that is a *maximum measurement*. Then draw a line with an awl or other sharp point. Do this again in another place on the end face of the work. (See Fig. 1). The center of the circle is on *both* lines; so that it must be exactly *where they cross each other*. If all the angles between the two lines are somewhere near right angles, the chances for a sharp crossing are better than when two of the angles are quite small.

The conical depressions may now be made. If the work is light in weight, a *center punch* may be used for this purpose. A few light blows with the hammer cause the punch to

or more, the precise depth depending on the weight, etc. The drill used will also vary in size for similar reasons. It may be as small as 1/16-inch in diameter; or it may be larger. When the holes have been

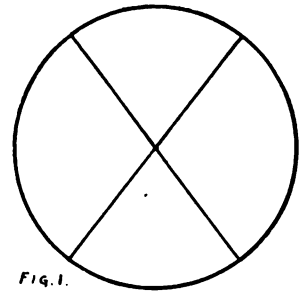


FIG. 1.

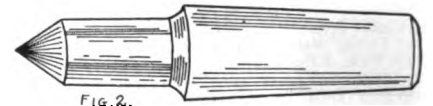


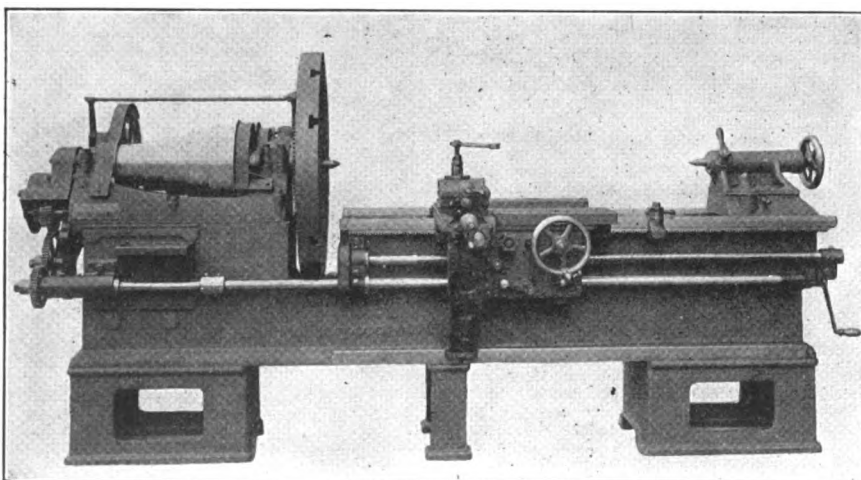
FIG. 2.

HOW TO FIND THE CENTER OF STOCK AND A LATHE CENTER

drilled thus, they may be drilled with a countersunk drill to give the proper form.

Work may sometimes be put on the lathe and tested before the centers are anything more than very shallow depressions. The lathe may now be run very slowly and the cutting tool brought up close to the work. Or, the work itself may be turned by hand, the two centers remaining dead. The eye will then detect even slight deviations from a true-running surface. Of course, the work itself may not be perfectly round, in which case we cannot expect the little gap between cutting edge and work to remain the same size while the work turns. There is a simple method which will sometimes operate to correct the error, if the work itself is round. An L-shaped bar (Fig. 3) is placed in the rest and secured in such position that it will present a considerable surface to the work. A *square center*—that is, one having its point in the form of a square pyramid—is used for the dead center in the tail stock. The lathe is put in motion and as the work goes round, not too fast, the tool rest operated to force the L-shaped piece against the work. This is done gradually. The result desired is to cause the square center to cut and recut the metal of the work at a point suited to true running.

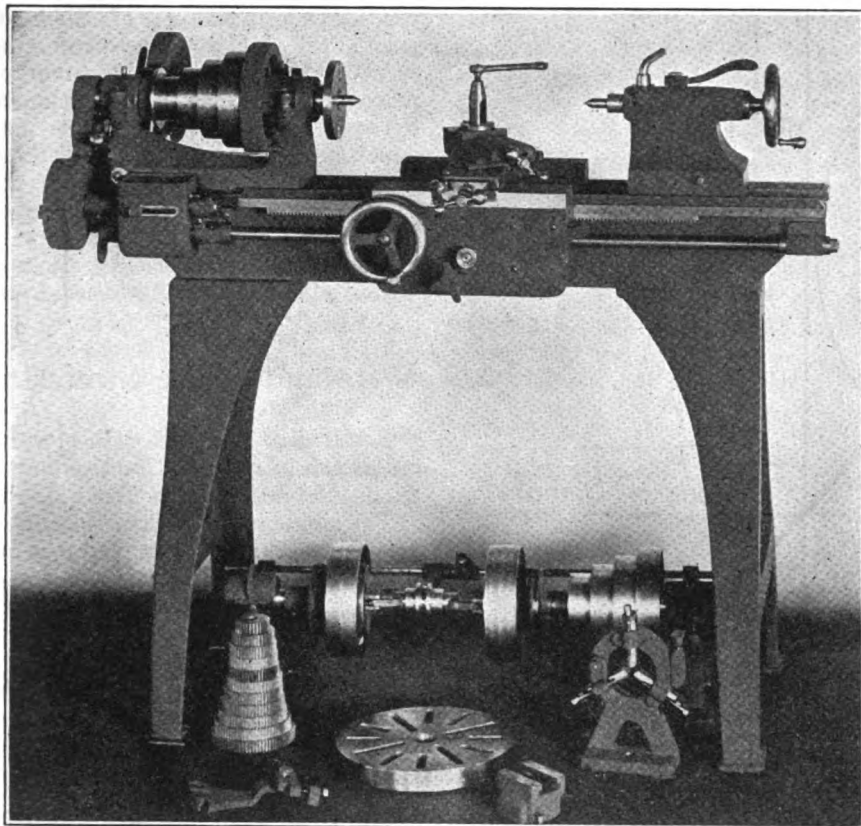
Work that is not properly centered may often be completed true to dimensions, but there will probably be considerable waste of time due to the small cuts that may have to be taken at intervals. For example, a



A MODERN LATHE. THIS ONE IS FITTED FOR BELT DRIVE WITH A CONE PULLEY

to permit the work to be held in position. The depression in the head of the work will now be on the live center in the head stock; the depression in the tail of the work will be opposite the point of the dead center

form the hole. The punch should not be held carelessly, but in line with the axis of the work. If the work is too heavy for so simple a procedure, holes may be drilled at either end to a depth of 1/16-inch



A SMALL WORCESTER LATHE WITH A LIVE CENTER AND A DEAD CENTER IN PLACE. A SMALL FACE PLATE IS MOUNTED ON THE LATHE WHILE ON THE FLOOR IS A LARGE FACE PLATE AND A STEADY REST

cylindrical steel bar is to be cut down $\frac{1}{8}$ -inch over a portion of its length. The centering may be done in such an imperfect way that on every turn of the work half the cut will be a heavy one and half the cut a light one. This is a waste of time.

When cylindrical work is being tested to determine whether the centering is being started correctly, we may mark with chalk the region which comes closer to the cutting tool. Such marks will then afford a means of correcting the centering. A very slight depression made with a punch may often be drifted over a little by holding the punch at an angle to the axis of the work and striking a light blow or two. The actual center should be made, however, with the punch held in line with the axis. Before the two centers—one at either end of the work—are given their full depth, the testing on the lathe with shallow depressions should result satisfactorily. When absolutely certain we have the centers started at precisely the points wanted, a heavy center punch may sometimes be used to give full depth, the blows being applied with some force. At other times, the work will require drilling.

There are two operations in drilling a center in work. First, a small

drill hole is cut in line with the axis of the work. Then a conical hole is countersunk by drilling. (See Fig. 4). The small drill hole of the first operation must be deep enough to have its bottom distinctly out of reach when the point of the lathe center is introduced as far as it will go in the countersunk hole. The angle of the countersunk cone must be exactly the same as the angle of the lathe center. Usually this will be 60 degrees. It is good practice to drill all centers where the work is such as to require much turning or where the work will in future come back to the lathe. Of course, the drilling of centers should not be done until the preliminary rotation of the work between the lathe centers shows the shallow punch depressions to be accurately placed.

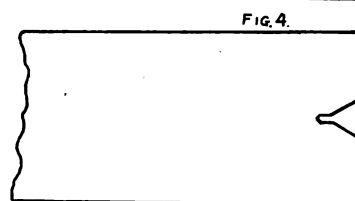
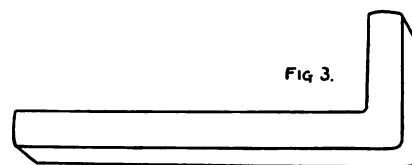
It should not be understood that it is only round bars that may advantageously be turned on centers. A very considerable variety of work permits of being chucked thus. In fact, if center chucking is possible, in view of the results that are to be gotten, it should be generally adopted. When work has once been properly prepared by drilling for chucking on centers, it may readily be taken off and put back on the lathe. *This is often a great advan-*

tage. It is well then to be on the alert to see whether the work may be chucked in this way. Work may sometimes be very irregular in form and yet be adapted to center chucking. There are cases, however, where the drilled centers are objectionable, thus necessitating some other method of putting the work on the lathe.

It is necessary to have some proper means of turning work mounted between centers. This is done through the assistance of three attachments the *driving plate*, the *driving pin* or *pins* and the *dog* or *carrier*.

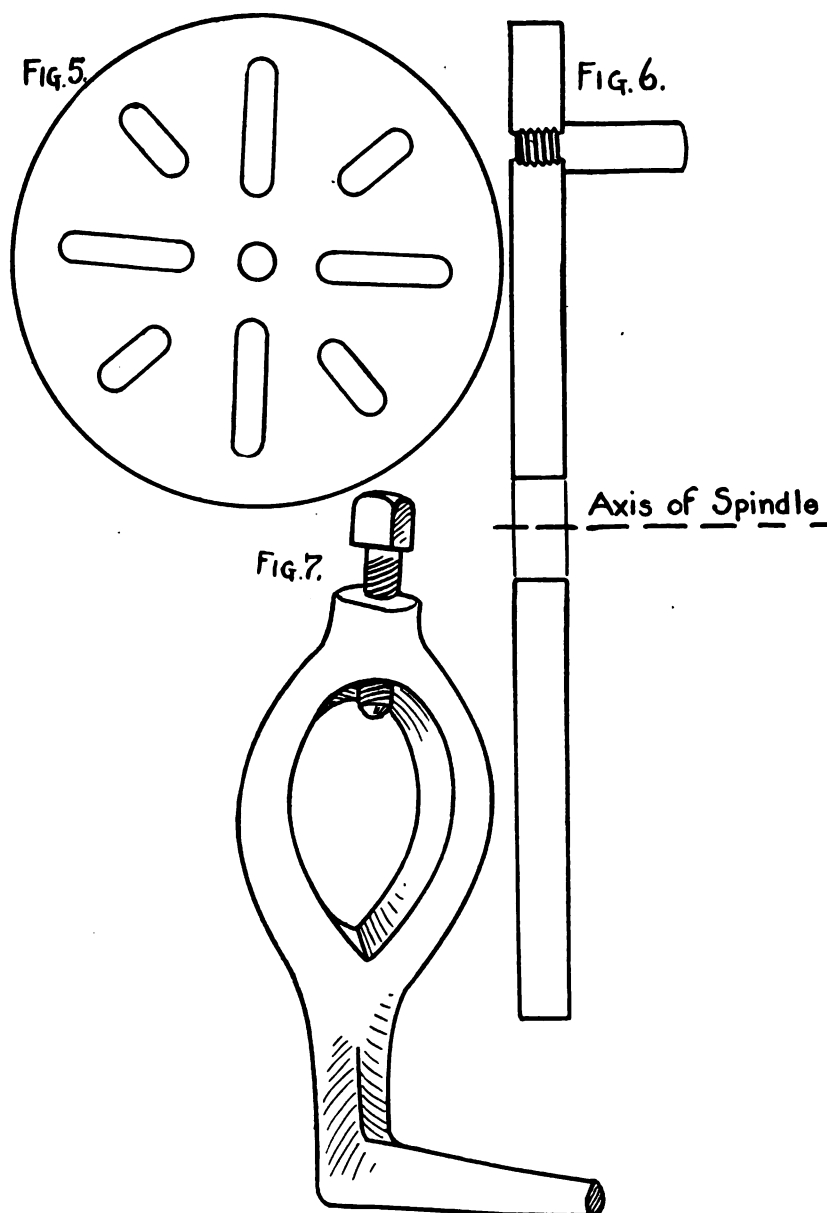
The dog or carrier is made to grip the round surface of the work, holding it largely or entirely by friction. This attachment has one or more projections, called *tails*, which extend away from the work each in the direction of a radius. The dog and its tail is not so different from a hub and a spoke if we imagine the work to be in the hub. It will be understood that forcing the tail round will result in the work being rotated. The driving plate is provided with the pin which projects out from it. The object in view is that when the spindle, driving plate and driving pin all rotate as one piece, the pin will bear against the tail of the dog and so carry the work along.

There are several varieties of driving plates. Some have hotels (Fig. 6) into which the driving pins may be inserted when desired. Others have slots running in radial directions. Or, the slots may be in the form of short arcs of circles. A



AN L-SHAPED BAR AND SECTION OF CENTERED STOCK READY FOR LATHE

driving plate may have both slots and round holes. All the perforations, whether round holes or slots, are provided for the purpose of enabling driving pins or similar devices to be attached. A round hole provides a fixed position which cannot be varied. Of course, with plenty of such holes, we will have a



THERE ARE SEVERAL VARIETIES OF DRIVING PLATES AND ALSO OF LATHE DOGS

choice. A radial slot permits the pin to be varied in its distance from the axis of the spindle and of the work. A slot in the form of an arc permits the pin to be shifted in circuit.

Driving pins are of various styles. Some may simply be inserted into the round hole and are not provided with means for adjusting them as to length of projection from the driving plate. Others are threaded for a distance along the body and are held in place by two nuts, one on the front side of the driving plate and one on the rear side. These may be shifted more or less—it depends on the length of the thread. That is, they may be made to project a greater or lesser distance from the plate.

Dogs or carriers also vary in form and manner of use. A typical dog (Fig. 7) is shaped something like

the end of an eye-bar. The opening is egg-shaped. A screw is arranged on the side opposite the tail for the purpose of being screwed up against the work, when the dog has been slipped over the latter. When screwed up until the work is gripped tightly, there will be three contacts of the work and the dog—two where the sides of the egg-shaped opening come against the work and one where the end of the screw touches it. Sometimes this will be scarcely enough to prevent slippage. Accordingly, some dogs have two screws, (Fig. 8) giving with the oval four points of contact. If the dog has but one tail, there is apt to be more strain on one side of the work than on the other. Where it is desirable or necessary to correct this unevenness, a dog with two tails may be

used—one tail being preferably opposite the other. The projecting screw head may be the source of more or less danger to the workman. Screws are made for machine uses which have no heads. Instead, there is a socket in the outer end of the screw, this socket being square or hexagonal in section. The screw is tightened and loosened by the use of a suitable key which fits the socket.

(To be Continued.)

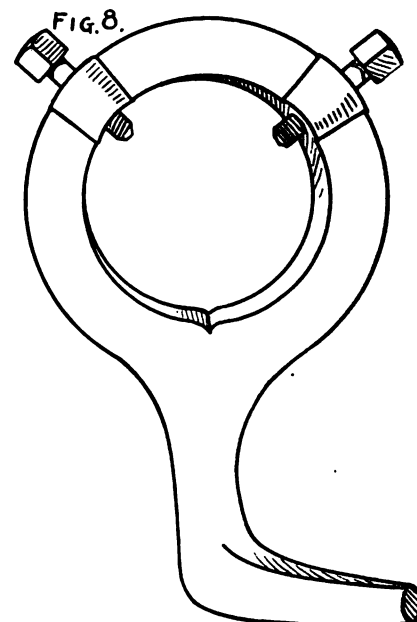
Wire and Fence Stretchers

L. R. SWARTZ.

I will give plans of such stretchers as are in use here for tightening single and woven wire fencing.

The single stretcher at A is simply a lever to which a wire clamp is attached by means of an eye-bolt and eight or ten inches of 5-16 chain or a piece of trace chain which is attached at about 6 or 7 inches from the end. Good tough plank should be used in making this lever. I used 1½ inch plank. The end next the fence post should be shod with a toothed piece of iron to prevent slipping. The lever should be about 4 inches wide at the large end.

One can sometimes find a wire clamp ready made, but if not, they are not hard to make. To make the clamp take a piece of 1 inch by ½ inch stock 6 inches or 7 inches long. Make a hole and round up the eye in one end for the chain, turn off about 1¼ inch of the other end edge wise, then put into the vise and turn over letting the vise grip about half the width of the main bar of stock. Just lightly crease this ledge next



A LATHE DOG WITH TWO HOLDING SCREWS

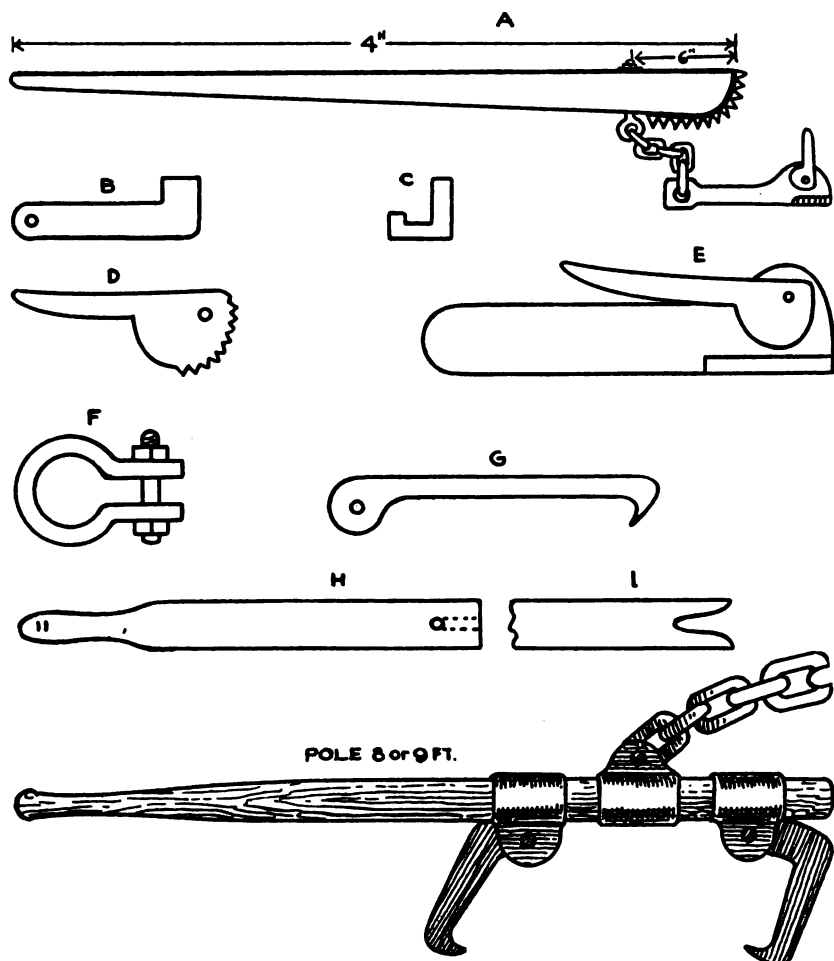


to the lug formed by the stock off set to accommodate the wire.

Next make the toothed cam or eccentric out of a piece of spring, a file, or tool steel and lay (see E) with handle along edge of stock and the tooth of cam just touching the ledge of the clamp. This will give the position for the hole in the lug through which the rivet passes to fasten cam to lug. This cam opens and shuts by moving the handle as a pair of tongs. A piece of wire spike makes a good rivet. The teeth of

be put through the lugs to fasten them to the pole and also to act as hinges for the grabs and to fasten the short chain that goes around the post next to the stretcher. The grabs are made of $1\frac{1}{2}$ inch to 2 inches by $\frac{3}{4}$ inch tire iron or 1 to $1\frac{1}{4}$ square bar. The stock is flattened at the eye. In making the claw of the grab, the point should be drawn and in making the cleft to grip chain a $\frac{1}{2}$ -inch hole should be first punched at the fork of the cleft and the stock cut out to form cleft. The

fastened by the ring end to the middle band on the pole; the longer one is brought around the two planks leaving the ring end free. The pole is brought forward and the claw of the grab slipped over a link of the long chain. The motion on the pole grab up and a new hold is taken is reversed which brings the other with it on the chain. When the second grab takes up the strain the first becomes loose. This arrangement is much liked by farmers in this section and it is cheap and strong.



WIRE AND FENCE STRETCHERS FOR TIGHTENING SINGLE AND WOVEN WIRE FENCING

cam should be tempered about the same as a cold chisel or a lathe tool.

The stretcher for woven wire fencing and poultry fence is a larger affair, and must be strong; as it stretches the whole web of the fence. However, some of our smiths here have managed to get up a good stretcher without much difficulty by using a tough pole or sapling for the lever. This pole is usually about 3 inches in diameter at the butt where the irons are fitted.

Three bands F of tire or band iron about three inches wide are made, so that $\frac{5}{8}$ inch or $\frac{3}{4}$ inch bolts may

claw is then bent. The bands with grabs and the middle are rigged to the pole as shown at J.

These bands are set four or five inches between centers. For holding the fencing a couple of pieces of 2 inch by 6 inch plank a little longer than the height of fence are bored to receive six or eight, $\frac{1}{2}$ -inch by $4\frac{1}{2}$ or 5-inch carriage bolts. A piece of plank is placed on each side of the web of fencing, the bolts put into place with plate washers and screwed tight.

A couple of chains such as log chains are used. The shorter one is

Safety in the Forge Shop*

Most of us have seen pictures illustrating the efforts of primeval man to fashion a weapon or a domestic utensil from metal. A large stone took the place of the modern anvil and a smaller stone served as a hammer. These with a nearby wood-fire, constituted the equipment of the earliest recorded forge shops. The equipment of the forge shop of the present day differs only in the more perfect adaptation of the tools for the work in hand, and in the method of heating the metals. The principle of working the metals,—namely, by pressure either intermittent as in hammer blows or constant as in hydraulic presses,—is the same.

Although there are no records, it is fair to assume that primeval man was subject to what he might have considered annoyances in the form of burns and bruises. These same hazards are present in the forge shop of today and are accepted by the smiths as necessary evils. A piece of iron or steel may be hot enough to cause a painful burn and still have the appearance of cold metal, and burns caused by the smiths mistaking these hot pieces of metal for cold ones are very common. It is often a little inconvenient to get a pair of tongs before attempting to handle a piece of metal on the shop floor, but it is much safer to do so.

Another danger to which forge-shop men are subject is that of sparks flying from hot metal. When a smith takes a bar of iron or steel from the fire he almost always gives it a light tap on the anvil to knock off the oxide. Even with this precaution the first few blows of the hammer or sledge are likely to produce a shower of sparks, and a large spark of this kind, lodging in loose or ragged clothing, may burn

*From The Travelers Standard, published by The Travelers Insurance Company.



the skin or even set fire to the clothing. This danger is so well recognized that, as a rule, smiths wear leather aprons which protect the body from the chest down. One of the inconsistencies in the forge shop lies in the fact that much more vulnerable than any other part of the body. There is probably no other organ of the human body so important or so necessary to the workmen, from the standpoint of either safety or efficiency. A single spark may be sufficient to destroy the sight of an eye, and yet the smith will seldom wear protectors. A burn caused by one of these sparks on any other part of the body will heal in a short time if proper care is taken, but the same cannot be said of the eye.

Another point in the forge-shop equipment that requires careful attention, but is often neglected, is the condition of the tools. Swages, flatters fullers, breaking-down tools, and tools of various other kinds that are frequently subjected to sledge-hammer blows, often have their heads reduced to a burred condition. Sooner or later some of these jagged, burred projections will fly off under the hammer, and it is then purely a matter of chance as to whether or not some one is injured. Better work can be done with a good tool than with a poor one, and therefore economy as well as safety is increased by repairing or discarding tools with burred heads.

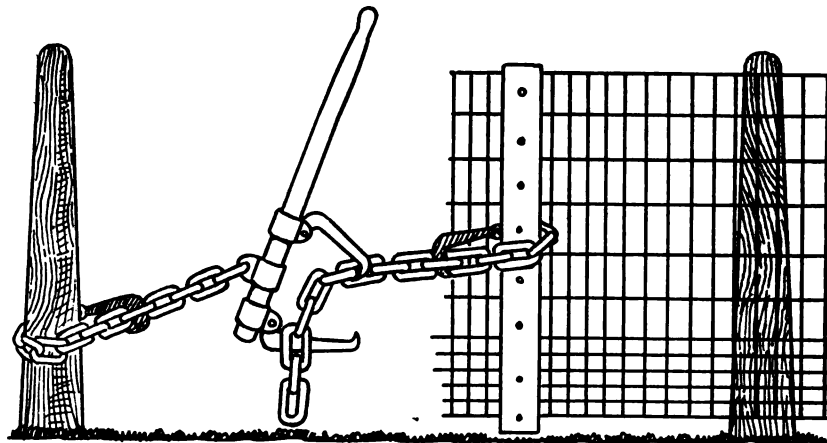
The advent of drop or stamped forgings has had an important influence on the iron and steel industry. Forgings of this kind can be turned out much more quickly than castings, and they are often much cheaper also. The uniformity in dimensions and accuracy in shape that are characteristic of such forgings likewise adapt them very well for economical machining or finishing.

Two types of hammers are in general use for stamped forgings,—namely, the board drop-hammer and the steam hammer. The board drop type is commonly used for small forgings, while the best results for large pieces are obtained by using the steam hammer. Larger forgings, plate work, and work in which bending operations are prominent, are best produced by hydraulic presses. The product of these presses is often several feet in length, and is much more massive than can be handled by drop-hammers.

When drop-hammers were first introduced, it was thought necessary to provide foundations having a cer-

tain amount of resiliency in order to start the hammer on its return, and at the same time remove the scale by vibration but foundations of solid concrete are now being used with much better results than were attained by the old type. Tarpaper, or boards one or two inches thick, should be placed between the base plate and the concrete, to prevent

ward position, and even then his view of the work may be obscured. When a battery of these hammers is in operation, the noise is so great that it is almost impossible to give oral instructions or orders to the men at the hammers, and signs must be used instead. A mistake in giving or interpreting the signs, or failure to see them, coupled with



HOW THE WIRE FENCE STRETCHER IS APPLIED AND USED

excessive wear or grinding at the top of the foundation. It is claimed that a drop of the hammer on this type of foundations brings about better results than a drop one-third longer on the old type. This means a saving in time and power, and in some cases, does away with the necessity of a second heat. The modern drop-forge shop is equipped with a suction system by means of which the scale is removed from the dies.

What has been said above regarding the necessity of protection to smiths from flying sparks applies with equal force to drop-hammer operators. In each case hot metal is worked, and although dies are used in connection with drop hammers, so that the scale cannot escape as readily as it does from the smooth surface of the smith's hammer, the drop-hammer delivers far heavier blows, and the sparks that it produces are forced out at a much higher speed, and even the smallest of them gives rise to a distinctly hot, stinging sensation upon striking the body.

The operation of many of the single-frame steam hammers in use today is fraught with hazardous possibilities. The steam throttle lever is often so located that the operator's view of the work is obstructed by one of his arms, while with the other he adjusts the controlling lever. To avoid this he must stoop over in an exceedingly awk-

ward position, and even then his view of the work may be obscured. The danger from this source has been largely eliminated in the newer designs of steam hammers wherein the controlling lever and the throttle lever are placed on one stud, a rod forming the connection between the throttle lever and the steam valve. The workman can then control both levers with his hands below his head, and he is thus enabled to see the progress of the work and correctly interpret the signs of his fellow workers.

Cold-press work and the trimming of forgings cause many distressing accidents unless proper precautions are taken to guard against them. The accidents from this cause are in the same class as those from punch presses. Crushed hands or fingers are most commonly met with. There is a fatiguing monotony connected with the work of placing forgings in the trimming dies, and therefore the operator who does this work by hand is likely to become momentarily careless, so that once in a while a forging is not properly placed in the die. In most cases it seems impossible to overcome the desire to correct the error, even though the lever has been tripped to let the hammer fall. Under such circumstances a serious accident is almost sure to occur. This danger is so well recognized in some shops that special tools are provided, or effective safeguards are installed, or



both precautions are taken.

In many shops in which forging or hammering is done, cyanide of potassium is used to a greater or lesser extent, for case-hardening. It should always be remembered that this substance is one of the deadliest poisons known, and special care should be taken to avoid taking any of it into the mouth, or inhaling any of the fumes that arise from it. Cyanide should be kept in a safe place and be plainly marked POISON, and it should not be allowed to become scattered about upon the floor, forge, anvil, or workbench. Draft hoods should also be provided for removing the fumes that are produced when working with cyanide, and nobody should be allowed to handle it unless he has been fully instructed with regard to the danger involved. This warning is specially important, because the men who use cyanide often do not know its deadly character, and it is hard to understand why more fatalities do not result from it, except upon the theory that there is a special good angel that looks after blacksmiths and others engaged in similar work, to keep them from this particular form of harm. We have seen men who should have known better (but did not), thrust pieces of hot metal into cyanide, and stand over the work with the fumes rising up all around, while they were blissfully thinking of a circus parade, or some other harmless and distant thing.



Benton's Recipe Book

"Holes in Castings", says the English Mechanic, "should be located at a certain minimum distance from the edge of the casting. A drilled bolt hole should be located at least one and one-fourth diameter from the edge of the casting; a cored bolt hole, one and one-half diameter; a drilled rivet hole, one and three-fourths diameter; and a cored rivet hole, two diameters from the edge of the casting."

A Welding Compound for Steel, is suggested by Philo Bundy as follows: "To one-half pound of powdered borax add two ounces of carbonate of iron and two ounces of black oxide of manganese. Get your work hot—the higher the steel, the

higher the heat—sprinkle on the compound and place in the fire. For ordinary welding use powdered borax and carbonate of iron only—leave out the manganese. A spring welded with the above compound and then allowed to cool will not break in the weld as many springs do when welded with borax or other compound.

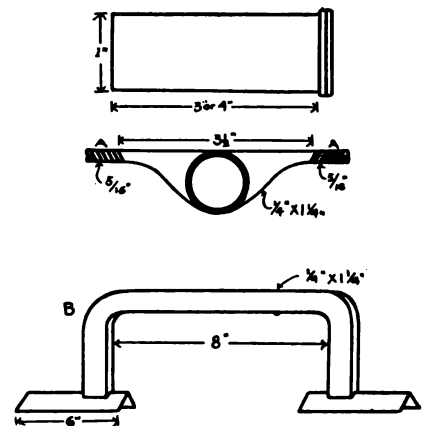
To Remove Paint from Iron try the following mixture: To one pound of lime add four pounds of potash and mix thoroughly with six quarts of water. This will soften the paint quickly and is much cheaper than the paint removers generally used.

A good point to remember when heating tools that consist of thick and thin parts, is to heat the thick part first and then to allow the heat to run to the thin part. This prevents overheating the thin parts before the thicker portion is properly heated.

A green finish on brass may be produced by applying the following mixture: Add one ounce of nitrate of iron to eight ounces of hyposulphite of soda and mix with a gallon of water.

To hold small screws when repairing small articles such as clocks, guns, phonographs and small machinery, the following stunt will prove valuable: Take a strip of stout paper or a cord and push the end of the screw through this. Now hold the screw in position with the card or paper and after turning it in the hole a short way, tear the paper or card away, when the screw may be turned to a firm seat.

Aluminum solder is again in demand. It seems to me I have handed out more recipes for soldering aluminum than for any other job in the book. But the patience of the columnist is as that of Job—so here it goes again: To solder aluminum it is necessary to tin the parts thoroughly before attempting any soldering. Use a combination of 5 parts tin to one part aluminum for tinning, and instead of the ordinary soldering iron one of pure aluminum is necessary, according to some authorities, although others say that the ordinary soldering copper well tinned with the tin-aluminum solder will work very well. It must be remembered in aluminum work that the metal is very short and will not stand a great deal of heat without collapsing. Recently, since the introduction of the Oxy-Acetylene blow pipe, attempts at soldering aluminum have given way to welding by the oxy-acetylene process, which if expertly done is far superior to soldering at its best.



TWO HANDY HELPS FOR THE REPAIRMAN

A belt dressing is wanted by M. G. H. This is another recipe that has been given several times. Here is a belt dressing that can be easily made at home and it is one that is really excellent: Take one-half pound of pure bees-wax and melt it. Then add to it very slowly one-half gallon of neats foot oil. While pouring the oil stir constantly so as to get a good thorough mixture of the two ingredients.



Queries—Answers—Notes

Welding Spring Steel—Brother S. M. LeBlanc, Nova Scotia, inquired in the March number if self-tempering spring steel could be welded. It can be welded as easily as iron, if he will get some E. Z. welding compound and weld the same as any other metal. If you wish to draw the spring out as long as before broken, apply plenty of compound when getting the second heat and you can draw it a plenty without making the spring thinner. I welded my auto spring a year ago and have tested it over rough roads with heavy loads and it is as good as new now.

I am interested in Oxy-Acetylene welding and hope to hear more about it through your paper.

E. M. ALLEN, Virginia.

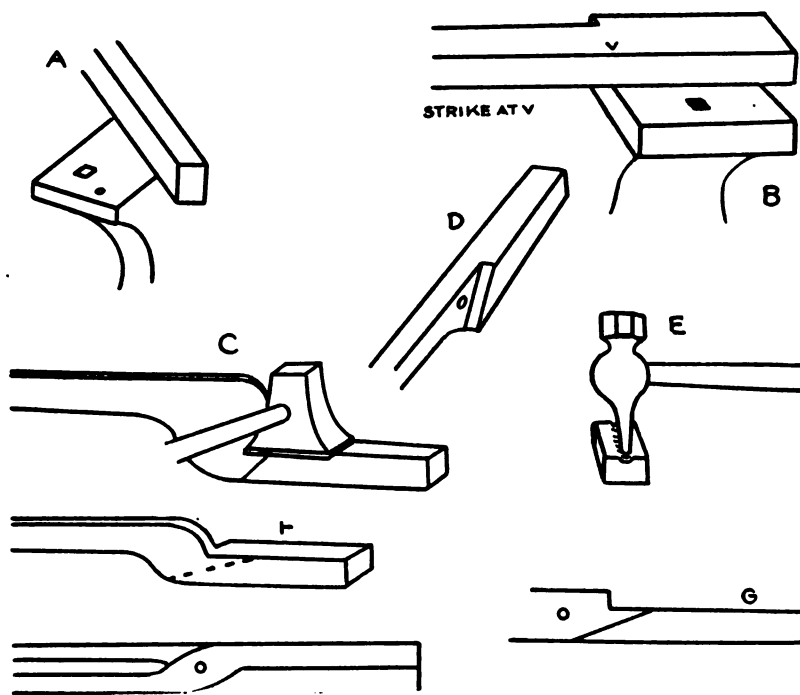


A HANDY TOOL FOR THE IMPLEMENT REPAIRMAN

A Handy Tool: The accompanying illustration shows a tool for riveting ledger plates to the mower guard without removing the guards from the bar. The loop which goes over the end of the mover guard is made of 3/8-inch round stock, while the lever or bar proper is made of one inch by 1/2 inch stock and three feet long. The point at X rests on the rivet when the tool is in use. W. L. MASKEE, Iowa.

Loose Channels on Auto Wheels:—I would like to hear from some brother smith about repairing auto wheels where the channels are very loose. What is the best method of repairing them? This auto work is getting to be the business. W. L. WATSON, Nevada.

Two Handy Devices Am doing all kinds of welding and brazing with my Oxy-Acetylene welder and have lots of work but do not do any plow work, horseshoe-



THE STOCK USED IS ONE BY SEVEN-EIGHTS INCH

ing or other heavy blacksmithing, nothing but strictly welding and all kinds of machine work, turn auto axels and drive shaft.

Herewith is an engraving of a jig to hold bicycle forks when threading in the lathe. It is forged as shown and welded on the end of a one-inch pipe three or four inches long. In use the threaded ends AA are placed in the holes and nuts put on. The lathe chuck grips the pipe. Set offset to line up with the stem. The center goes in other end. You can cut thread in a hurry and have a chance to try cone until you have a fit.

The device at B is for lining up boilers flues and tips and other round rods. It is made of $\frac{1}{4}$ by $1\frac{1}{4}$ inch stock and two pieces of one-inch angle iron.

J. E. ERICKSON, Minnesota.

Making and Repairing Automobile Springs: First I have pins for all sizes of spring eyes and I use the best grade of steel. Cut the steel the right length for the leaf, then roll up one eye and bend the other end short so as it will go into the tire bender rolls. Then bend about a half inch more than you are going to fit this leaf to, and roll up the other end. Then when you are ready to fit the leaf all that is necessary will be to give the leaf a few light taps on the back. And it only needs a few if you get plenty of bend in it. This is a much better way than heating and bending with tongs, and a spring will stand much better than one heated, that is if you have no way of heating and tempering. I can make a new master leaf very easy in a half hour. I charge \$3.00 for the master leaf and \$10.00 for a new half. I have been in the business all my life and I have a two-story shop 100 feet by 40 feet with all modern power tools.

W. L. WARSON, Nevada.

Endorsing Dr. McDonough's Idea: I will take off my hat to Dr. McDonough. He has brought out some ideas that are very practical and will bear investigation. His idea is the same as the difference between a round flat ring and a triangle. The ring will give a steady resistance while the triangle only gives resistance at the

three points and giving a sort of wobble between the points. This of course, would apply to a calked shoe as a flat shoeing gives an even base of its own.

Also I want to endorse Mr. G. L. Hughes' idea of a bar shoe for contraction. It is just as he says that most of the ones who reject the bar shoe, cannot make one or else do not know how to apply it after it is made. In fact I worked for a man once, some years ago who, when applying a bar shoe would not let the bar rest on the frog under any circumstances, and I want to say right here that if it were not for publications like "The American Blacksmith" there would be more of this "butchering" than there is, and we all know there is enough of it

done. These little friendly arguments all tend to bring the practice of horseshoeing to a better level.

Say boys! do you realize that these war prices on our materials have tended to drive some of our cheap shops to the wall or else made them raise their prices, which comes hard after being in the cheap rut for so long.

C. L. MORMAN, New York

To straighten curved celluloid sheets:—The Celluloid sheets for the windows in auto top curtains come to us in rolls and we have difficulty in straightening the curved sheets. How can we straighten the sheets so that windows can be easily replaced.—W. A. Y., Indiana.

In reply:—One manufacturer advises that the celluloid be ordered shipped flat as the sheets will keep their shape when curved.

Another manufacturer writes as follows: "The only way we know of to straighten out celluloid is to lay it on a flat surface like a bench and roll it up in the opposite direction to that in which it is inclined to curve. Repeat this process several times and then lay a flat shipping case cover or something similar on it with weights and after 24 hours the celluloid should be perfectly flat."

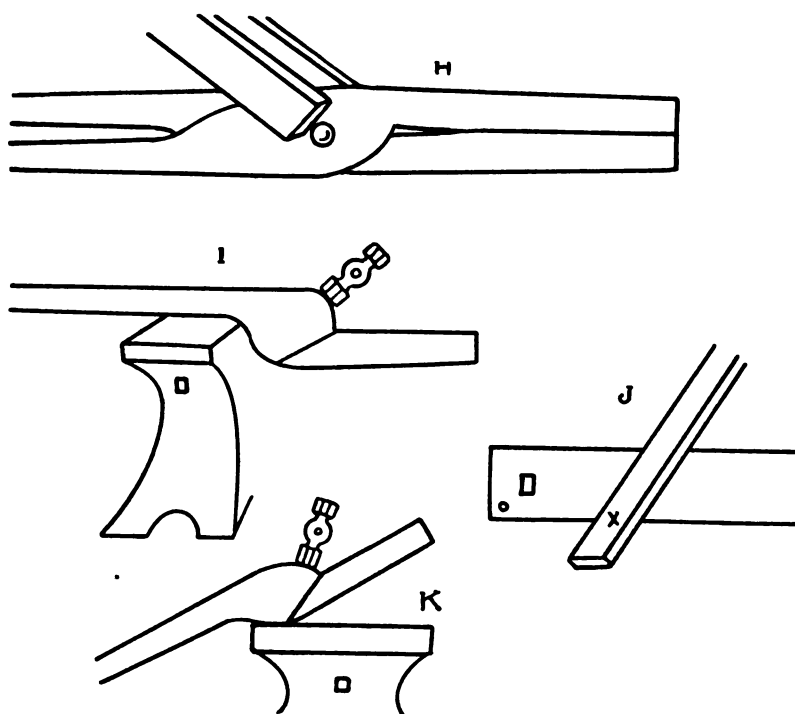
A third correspondent suggests subjecting the sheets of celluloid to steam heat or hot water and then lay them on a flat surface under flat boards and weights, then the sheets will not curve.

The Manufacturers of Pyralin write: "We must advise that the only method we have to suggest is to roll these sheets in opposite direction which we find as a rule, accomplishes the purpose quickly and satisfactorily."

"It is true that sheets can be straightened by heating which softens the material, but in doing this there is great possibility of spoiling the finish and injuring the quality of the material."

SUBSCRIBERS SERVICE

A Review of the June Issue—The borax article in June is very interesting. I think that the merit of borax was discovered



MR. DENBO ILLUSTRATES HIS WAY OF MAKING TONGS



by accident. As far back as I can remember, borax was used. Now every welding compound has borax for its foundation. The writer of the article, speaks of welding compounds that contain iron fitting or drillings as being of doubtful value. The Cherry Heat welding compound for instance contains soft steel drillings or lathe turnings. When this is used for welding the mistake is made by getting the iron or steel too hot and burning the steel in the welding compound. An article appeared in "Our Journal" not long ago in regard to this. Borax in its raw state, as we use it in general, contains some impurities and some sulphur. What per cent I don't know, but there is some. I visited a plow factory some years ago and noticed that the borax had been baked and ground before being used. No other ingredient was added to it. The part to be welded was heated in two fires and the borax was shoveled on to the work while in the fire and when brought to right heat was brought to the hammer and welded. Dr. Powell's article on corns is like all the rest. The other fellow was wrong. Brother G. L. Hughes with his raps and the bar shoe idea must have been terribly moved. This is the first time I've ever seen his name in print. He's a little different from our New Jersey Brother. I'd like to hear from him again. To the brother who wishes to know about the Brook's tire setter, I would advise him to get a hydraulic power of that make.

Now about the Tongs; I notice R. R. Tichenor's article on his idea. He is O. K. but I think I can show him a point. The stock used is one inch or $\frac{3}{4}$, according to the size of tongs. The engravings tell the story.

JOHN DENBO, Illinois.



The Automobile Repairman

Modern Battery Ignition Systems

VICTOR W. PAGE, M. S., A. E.

Because of the almost universal employment of electricity for lighting and starting systems, the battery ignition system has been improved materially inasmuch as the storage battery supplying the current is constantly charged by a generator. A number of systems have been devised, these operating on two different principles, the open circuit

and the closed circuit. One who is familiar with the battery ignition system of five or six years ago that was so widely used before the general adoption of the magneto, remembers a system of the general form shown at the top of Fig. 1. The batteries were used only for ignition purposes, a storage battery furnishing the current normally used and a set of dry cells being provided for emergencies. The storage battery required frequent charging and as this was done from an external source, the motorist was put to considerable annoyance. A four unit vibrator coil formed an important part of the group and the vibrators gave considerable trouble as they required frequent adjustment and the points demanded attention as they had to be kept clean to insure correct action. Then the roller contact timer also required periodical cleaning and replacement of worn parts.

The modern battery ignition system is radically different from the old pattern, as a leaf has been taken from the magneto maker's book and the group has been greatly simplified. A one unit coil now serves all cylinders and the timing is accomplished by a quick acting interrupter working with such speed that it will furnish reliable ignition at the highest speeds the engines are capable of. The old vibrator coil system did not permit an engine to attain high speed because of mechanical and electrical lag in the timer mechanism and vibrators. Combining a distributor with the circuit breaking device and having no vibrator on the coil has given the same advantage of rapid action as with a magneto, except for heat of the spark, which does not increase directly with engine speed as it does in the high tension magneto.

One of the most popular of the combined starting, lighting and ignition systems is the Delco, which is shown at Fig. 2. For the present we will concern ourselves merely with describing the ignition function of the system, leaving the self-starting and electric lighting features out because they have no direct bearing on the subject under discussion. Current is produced by a one unit type motor-generator, although the windings of the device when operated as a motor or a generator are entirely separate. The ignition current is obtained either from a storage battery which is kept in a state of charge by the generator, or from a set of dry cells which are carried for reserve ignition. The ignition sys-

tem consists of a one unit non-vibrator coil, sometimes attached to the top of the motor generator, as shown, though it may be placed at any convenient part of the car and a dual automatic distributor and timer often included as a part of the device as shown. When ignition current is supplied from the lighting circuit, the current passes from

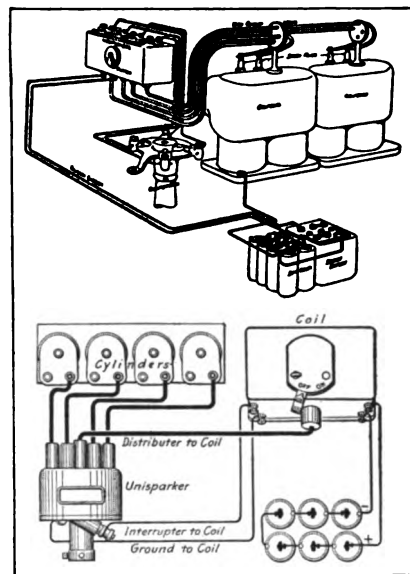


FIG. 1.—THE OLD AND NEW SYSTEMS OF BATTERY IGNITION AT TOP, FOUR UNIT VIBRATOR COIL AND WIPE CONTACT TIMER GROUP OF FIVE YEARS AGO AT BOTTOM, SHORT CONTACT UNISPARKER AND ONE UNIT COIL OF TODAY

the storage battery through a switch and out to the low tension winding of the coil, from whence it passes to the timer and from there to the frame, where it is grounded. The high tension current generated in the coil runs to the distributor, where it is switched to the spark plugs in the different cylinders in turn.

When dry cells are used for ignition the operation is the same except that a device called "the ignition relay," (Fig. 3) is added to the circuit. The function of this device is to break the circuit immediately after it has been completed by the contact points of the timer, which is shown at Fig. 4. The use of the ignition relay results in a material saving of the battery current as the circuit is closed a much shorter time than is the case when the circuit is broken by the timer contacts themselves. The operation of the relay is not difficult to understand. The magnet A, Fig. 3, attracts the armature B when the circuit is completed through the timer. This action opens contact C and breaks the timer circuit. A condenser D is mounted be-

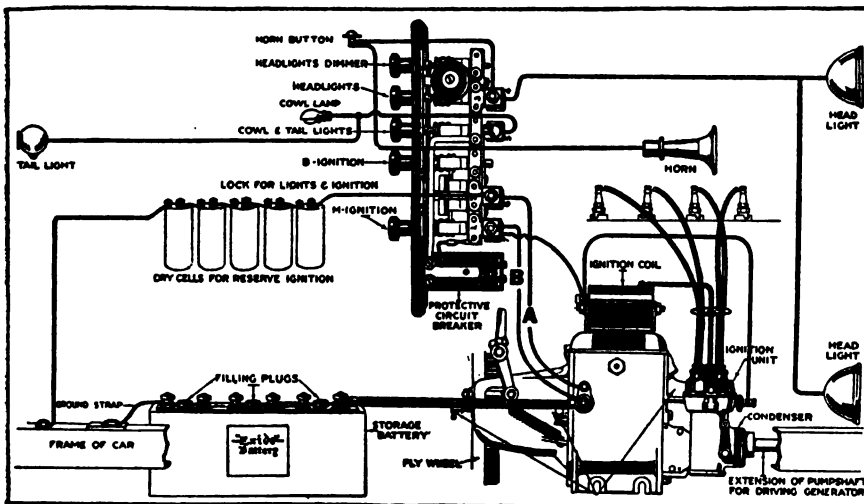


FIG. 2.—THE COMPLETE DELCO IGNITION, STARTING AND ELECTRIC LIGHTING GROUP SHOWING RELATION OF VARIOUS IGNITION PARTS

side the magnet coil A, in order to absorb the current produced by self-induction in the magnet winding, which would be apt to produce a hot spark between the contact points when they were separated if no means were taken for its disposal. The adjustment of the relay is at the pole piece E. This regulates the distance between the armature B and the magnet pole, and the gap between the contacts C. The adjustment is made by turning the notched head at E clockwise to increase, anti-clockwise to decrease, the gap between the contacts. The correct distance between contacts C when the armature B is pressed down is equal to approximately the thickness of one sheet of newspaper. A very simple way in which the adjustment can be made when the engine is running on the battery is to turn the notched head of the pole piece in the counter-clockwise direction until the motor ceases to fire. Then turn it four or five notches in the opposite direction. Under no conditions should the adjustment screw be turned very far in either direction. If the armature vibrates feebly when the starting button is pressed it indicates either weak dry cells or dirt between the relay or timer contacts.

The interior arrangement of a short contact timer for either dry cell or storage battery current is shown at Fig. 4. The cam is driven by a rotating shaft and establishes contact between the points when the cam rider rises on the point of the cam. When the cam rider drops into the notch between the high points the contact points separate. This gives a short contact, the intervals between them being greater than the length of contact periods. While the contact points are but one-eighth

inch in diameter, it is said that many thousands of miles of service may be obtained with out readjusting. It is important that the contact spring, which is the straight one carrying the platinum point, should have a good tension outward against the cam rider member below it. It is said that this spring should be capable of supporting the weight of half a pound. If the tension is not sufficiently great the contact points barely break contact which permits the spark to arc between them, tending to burn them.

The contact points should be so adjusted that the contact spring is forced away from the breaker member at least half the distance of the T-slot on the vertical part of the cam rider, when the latter is on the contact lobe of the cam. The contact points should open about ten one-thousandths inch (.010") when the contact arm rests upon the back stop. The contact arm should clear

the cam except at the contact lobe. A short wire connects the two posts of the breaker arms and this connection should always be inspected when making adjustments to insure that it has not been disturbed. It is said that if this wire is disconnected the current will pass through the contact spring, impairing its tension. Whenever the contact points are cleaned, care should be taken to have the surfaces parallel.

The contact points should be absolutely clean and bright and have smooth contacting surfaces. The distributor portion of the device, shown at Fig. 6, consists of a hard rubber block fitted to the top of the primary shaft, this carrying a brass quadrant that passes the high tension current to the spark plugs by means of contact brushes imbedded in the hemispherical cover. There is very light actual contact between the rotating quadrant and the distributor brushes, as the high tension current is capable of jumping any very slight gap that exist between them. Owing to there being very light contact, there will be no appreciable depreciation in the distributor or upper portion. The center terminal, which is in connection with the induction coil, is a combination of carbon and brass, and a light, coil spring in the cover bears against it to maintain positive electrical connection. The distributor cover is easily removed without the use of tools, as it is held by spring clips. Location or dowel pins in its lower edge insure that it will be replaced in the correct position.

It will be noticed that in the wiring diagram shown at Fig. 2, a protective circuit breaker is attached to the switch, shown more in detail at

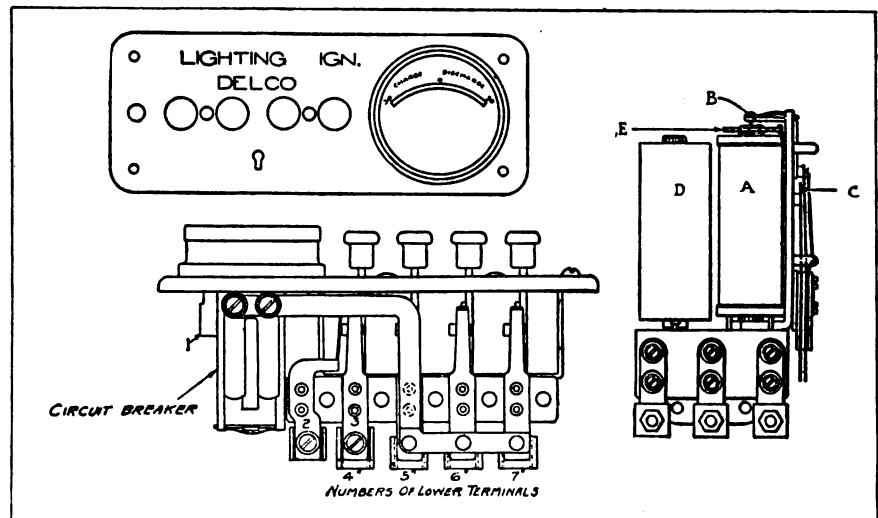


FIG. 3.—DELCO COMBINATION SWITCH AT LEFT, IGNITION RELAY AT RIGHT



Fig. 3. The function of this device is to open the circuit between the source of current supply (generator and storage battery) and the current consuming units (lamps, horn and ignition apparatus) if one of the wires leading to a current consuming unit happens to become grounded. Under such a condition an excessive flow of current is possible on account of the lessened resistance of the circuit. Such a flow goes through the winding of the circuit breaking relay or protective circuit breaker, which produces a magnetic pull that opens the contact and cuts off the current supply. As soon as the contact is opened the magnetic pull ceases and the contact is closed again, re-establishing the magnetic pull and again opening the contact. The circuit breaker will continue to vibrate until the ground or short circuit is located and corrected whenever anyone of the switches controlling the current consuming units is pushed in to establish a circuit. The function of this protective circuit breaker is the same as a fuse block and fuse except that it is not necessary to keep replacing fuses.

The ignition coil is much simpler when one unit serves all cylinders and the vibrator fittings are eliminated. The coil of the system just described is especially compact and simple. This is sometimes mounted on top of the motor generator and is what is generally known as the ignition transformer coil. In addition

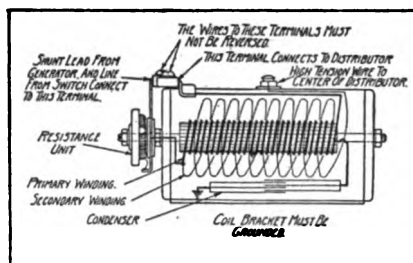


FIG. 5.—TYPICAL IGNITION COIL IN DIAGRAM FORM SHOWING RELATION OF WINDINGS

to being a plain transformer coil it has incorporated in it a condenser (which is necessary for all high tension ignition systems) and has included on the rear end an ignition resistance unit. The coil proper consists of a round core of a number of small wires. Wound around this and insulated from it is the primary winding. The circuit and arrangement of the different parts are shown in Fig. 5. The primary current is supplied through the combination switch and resistance on the coil, through the primary winding, to the distributor contacts. This is very plainly shown on the circuit diagram.

It is the interrupting of this primary current by the primary contacts together with the action of the

condenser which causes a rapid demagnetization of the iron core of the coil and induces the high tension current in the secondary winding. This secondary winding consists of several thousand turns of very fine copper wire, the different layers of which are well insulated from each other and from the primary winding, one end of which terminates at the high tension terminal about midway on top of the coil. It is from this terminal that the high tension current is conducted to the distributor where it is distributed to the proper cylinders.

The ignition resistance unit is for the purpose of obtaining a more nearly uniform current through the primary winding of the ignition coil at the time the distributor contacts open. It consists of a number of turns of iron wire, the resistance of which is considerably more than the resistance of the primary winding of the ignition coil. If the ignition resistance unit was not in the circuit and the coil was so constructed

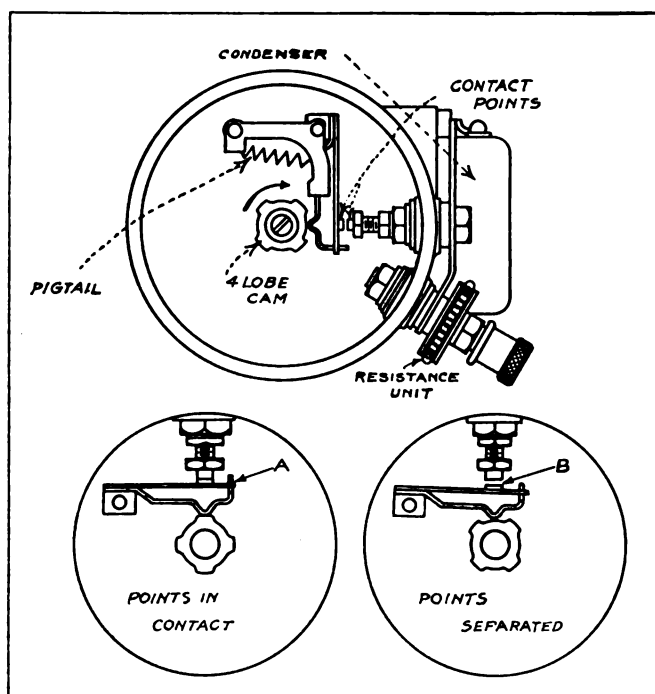


FIG. 4.—CONSTRUCTION OF DELCO SHORT CONTACT TIMER SHOWING OF ACTION OF POINTS

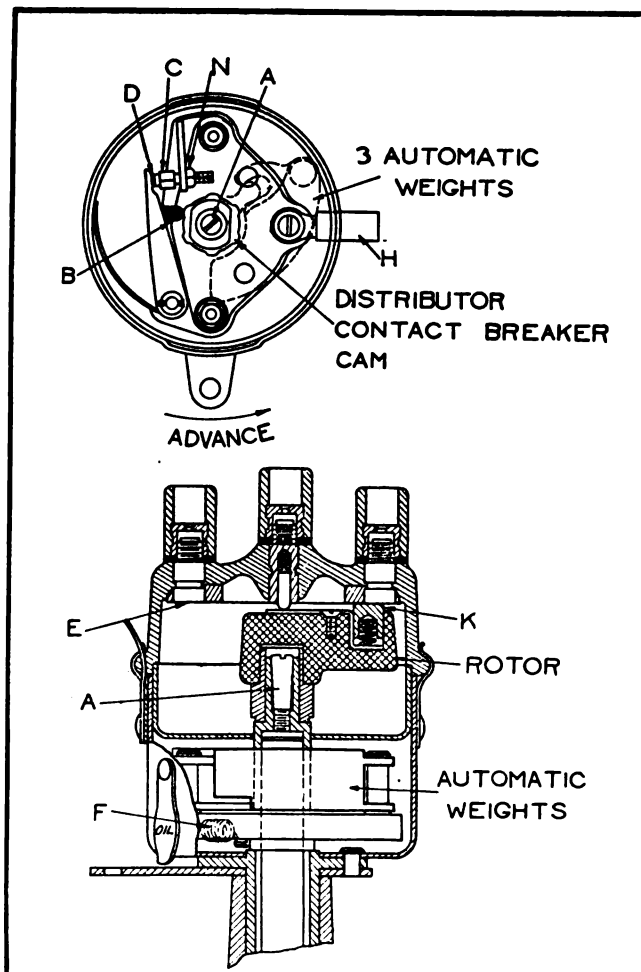


FIG. 6.—CONSTRUCTION OF NINETEEN-SIXTEEN DELCO IGNITION TIMER-DISTRIBUTOR FOR SIX CYLINDER IGNITION INCORPORATING AUTOMATIC SPARK ADVANCE MECHANISM IN TIMER BASE



to give the proper spark at high speeds, the primary current at low speeds would be several times its normal value with serious results to the timer contacts. This is evident from the fact that the primary current is limited by the resistance of the coil and resistance unit by the impedance of the coil. (Impedance is the choking effect which opposes any alternating or pulsating current magnetizing the iron core.) The impedance increases as the speed of the pulsations increase. At low speeds the resistance of the unit increases, due to the slight increases of current heating the resistance wire. The great advantage of the open circuit or short contact system is that the battery current is conserved more than in the systems having longer primary contacts.

An example of the closed circuit system is of Connecticut design, the complete ignition system consisting of a combined timer and high tension distributor, a separate induction coil and a switch. The system is distinctive in that the timer is so constructed that the primary circuit of the coil is permitted to

become thoroughly saturated with electricity before the points separate, with a result that a spark of maximum intensity is produced. The action is very much the same as that of a magneto on account of the saturation of the winding. Another feature is the incorporation with the switch of a thermostatically operated electro-magnetic device which automatically breaks the connection between the battery and the coil should the switch be left on with the motor idle.

Normally the timer contacts are held together under the action of a light spring. As the four cam lobes which touch a roller to raise the arm and separate the contacts, are 90 degrees apart for a four-cylinder motor, the period of saturation of the coil or the length of time the current flows through it to the battery is sufficiently long so that when the points have separated the current which has "piled" up induces an intensely hot spark at the plugs. This is an advantage inasmuch as it insures prompt starting and regular ignition at low engine speed as well as providing positive

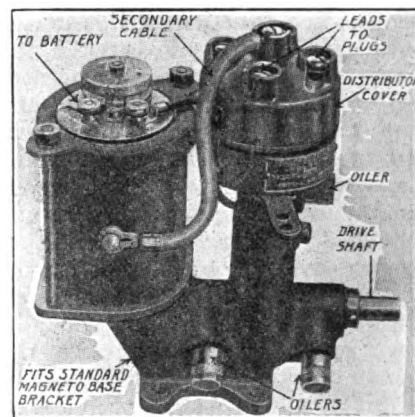


FIG. 8.—HOW TIMER AND COIL MAY BE MOUNTED ON BASE INTENDED TO FIT MAGNETO SUPPORT BRACKET

ignition at high engine speed. The timer construction is similar to that shown at Fig. 6, except that the points remain together a longer time than the period of separation and other slight detail differences are involved.

The thermostatic circuit breaking mechanism is very simple. This consists of the thermostat T, Fig. 7, which heats when the current passes through it for from thirty seconds to four minutes without interruption, and thus is bent downward, making contact with the contact L. This completes an electrical circuit which energizes the magnets M, causing the arm K to operate like the clapper in an electric bell. This arm strikes against the plate, which releases whichever of the two buttons in the switch that may be depressed.

The timer-distributor and induction coil are sometimes mounted together on a base piece that is intended to be secured to the magneto base plate of the engine and driven in the same way as a magneto would be. With a combination of this kind, as shown at Fig. 8, the wiring is very compact and very much simpler than that of a system where the coil and timer units are distinct, and placed at different parts of the power plant. While the action of the closed circuit or closed contact system is more like that of the magneto, it is only suitable for use where an engine driven dynamo keeps a battery constantly charged. The short contact systems may be used even if the batteries must be charged periodically from an external source independent of the car as the current consumption is very low. On one system having an exceptionally short contact, dry batteries will furnish sufficient current.

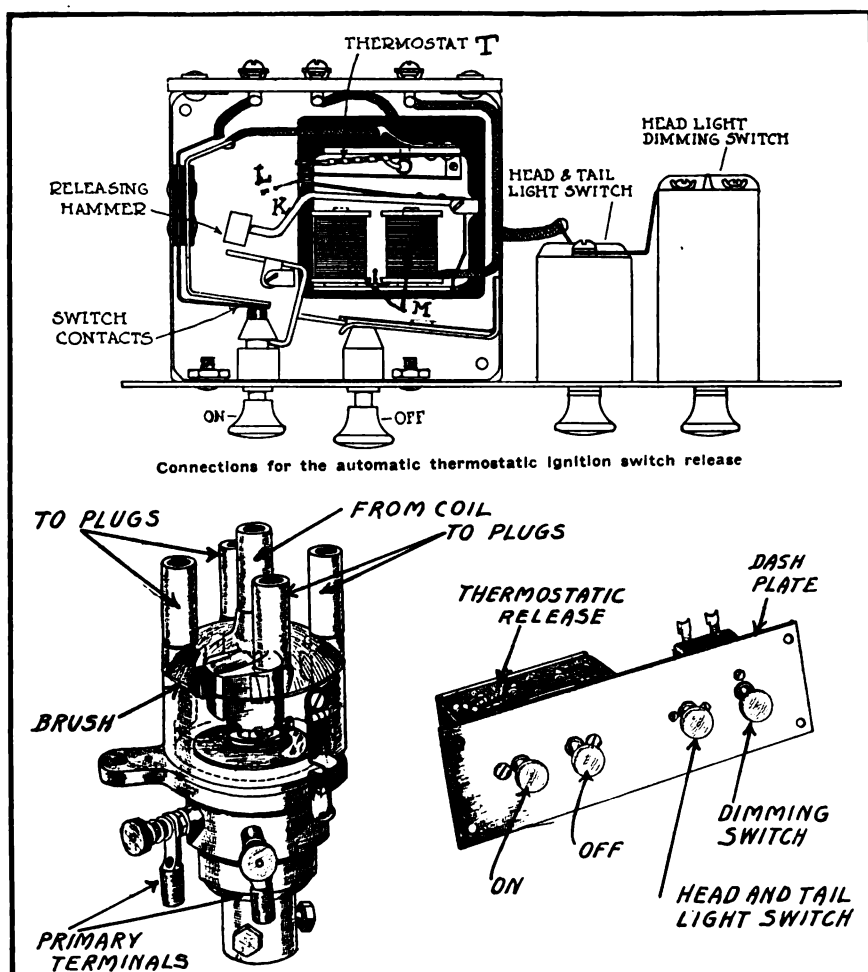
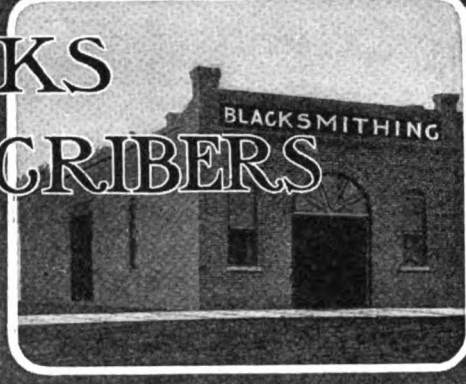


FIG. 7.—SHOWING AUTOMATIC THERMOSTATIC IGNITION SWITCH RELEASE USED ON CLOSED CIRCUIT SYSTEM



TIMELY TALKS WITH OUR SUBSCRIBERS



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THE NEW ARTICLES ON GAS ENGINE OPERATION AND CARE

This issue will introduce a new series of articles on the Gas Engine. These articles by Mr. J. L. Hobbs will run for quite a number of months and will cover the subject of gas engine installation, operation and care very thoroughly. Beginning with the selection of an engine, its delivery to the place of operation and its proper installation, Mr. Hobbs will go into the details of engine operation, and care. This series promises to be of extreme interest to both the gas engine owner and to the smith who contemplates purchasing.

The automobile repairman will also find this series of interest and value as the automobile motor is so closely related to the stationary gas engine that any added information that the smith is able to gain on one will help him in his work on the other.

THE INDEX OF THE VOLUME

On pages 310, 311 and 312 of this number you will find an index to Volume 15 which is brought to a close with this number. This index has been carefully prepared so that you may get the full value of THE AMERICAN BLACKSMITH as a reference work and for continued usefulness. When you are puzzled or when you have a hard job to do consult the Volume Index. The chances are you will find just what you are in need of in some past issue.

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Our Fifteenth Anniversary.

Fifteen years ago—September, 1901—the first number of THE AMERICAN BLACKSMITH made its appearance. Fifteen years have passed since "Our Journal" began its monthly visits to the members of the great smithing craft. Fifteen years have elapsed since "Our Journal" began its preachments for better prices, better work and more businesslike methods.

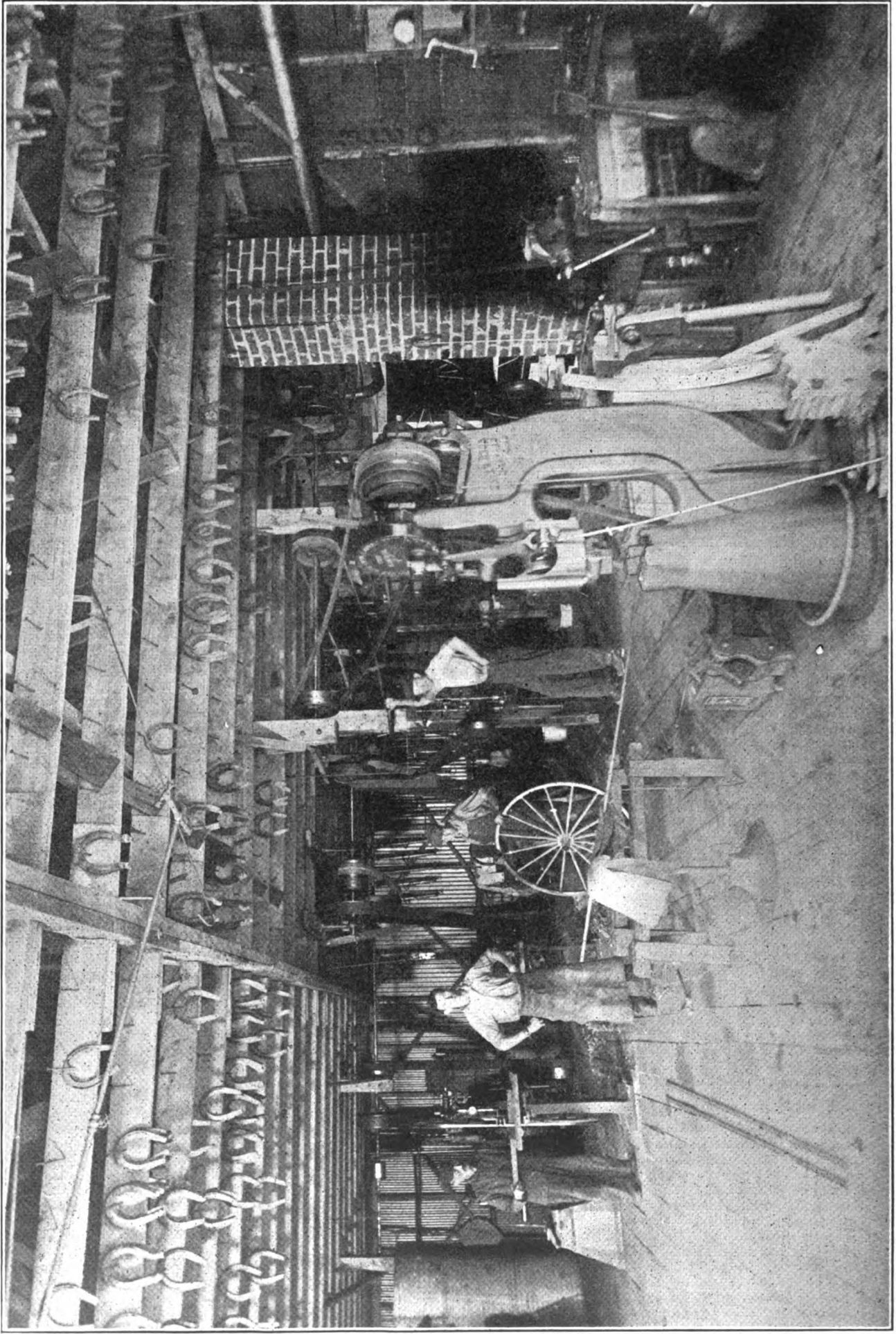
For fifteen years now has "Our Journal" taught and preached—spoken and cautioned—advised and counseled—and represented the smithing craft and smithing interests.

It is a long cry from that little book of fifteen years ago to the well-printed—profusely illustrated paper of today. And great progress and advancement has taken place, both in paper and craft.

Since the beginning "Our Journal" has stood for fair and square dealing—for clean methods—for clean living—and for a bigger and better craft. In its very first issue—that of fifteen years ago—"Our Journal" published the "Honest Dealings" paragraph. And each and every month since, that paragraph of protection has appeared somewhere in our columns. Not for one minute has THE AMERICAN BLACKSMITH forgotten its policy of blacksmiths first. Always has it kept the welfare of the craft in view. And in consequence it has seen the craft of fifteen years ago emerge from its mistaken ideas as to shop, equipment and methods into a condition more in keeping with modern ideas.

Great changes have taken place in the craft these past fifteen years. Changes that have put modern business methods into the shop—modern machinery on the shop floor—better prospects in the smith's mind—more money in the smith's pocket. And we are proud to say that "Our Journal", THE AMERICAN BLACKSMITH, has taken a most important part in bringing about these changes and improvements. It has, with the staunch help of "Our Folks" been able to start and to promote many reforms and changes in the craft.

And with the help of "Our Folks", THE AMERICAN BLACKSMITH will continue to support those things which are best. It will encourage better shops, better men, and better prices.



A POWER SHOP WELL EQUIPPED WITH POWER MACHINES IS A LABOR SAVER AND A PROFIT MAKER FOR THE SMITH



Gas Engine Operation Made Simple

The Purchase, Installation, Operation and Troubles of a Gas Engine

J. L. HOBBS

THERE has always been an air of mystery surrounding the gas engine. The only way to explain this air of mystery is, a very small thing will sometimes cause an engine to fail. Something which is entirely overlooked on account of the fact that it is small. Although an engine may appear in perfect working order there may be some little thing like a loose battery wire, a weak valve spring, a small grain of sand in the needle valve, a little sediment in the fuel supply pipe, a run down battery or a number of other things which would hardly be noticed by anyone who does not make a business of hunting for these troubles, yet any one of these little things will cause your engine to at least fail in developing its full power if not fail to run altogether.

It is the purpose of the writer of these articles to make all of these things so plain that any person with average intelligence will be able to run and repair his engine without the aid of an expert.

There is always a reason why an engine will not run. If an engine is in the condition its designer intended that it should be, it will run and develop just the amount of power it was designed to develop and in every way give entire satisfaction. If an engine fails to do as it should do it is up to the operator to be able to detect the trouble and remedy it. This you will be able to do after having studied this work until you thoroughly understand it.

We will take up all the different things in regard to the care and operation of a gas engine in regular order, in short concise numbered paragraphs, and furnish an index referring to the paragraph where you will find the information desired,

which will make this little book of vast importance to the operator as a reference book to aid in finding and remedying his troubles.

The writer of this book has had years of experience and training along these lines, and it is his intention to put the results of all these years of training, illustrated by experiences which he has had while actually in the field as a gas engine expert for one of the large manufacturers of internal combustion engines, into such plain concise terms that anyone will actually wonder why it is so simple.

Allow the assertion here that if an engine has proper compression, lubrication, gets the right mixture to its cylinder, and the mixture is fired at the proper time, it will run and develop its full rated power. If it fails in any one of these things it will fail in power in just the proportion that it fails in the four essential things of a gas engine.

The word Gas engine here is used in its broadest sense, and means any engine which uses an internal combustion or explosion as its motive power. The word makes of engines, but in all of them the fuel must be mixed with the proper amount of air to make the gas which will explode and give the proper power, so you see all internal combustion engines are gas engines in the fullest sense.

In order to give you an idea of what you will find in the following pages we will give

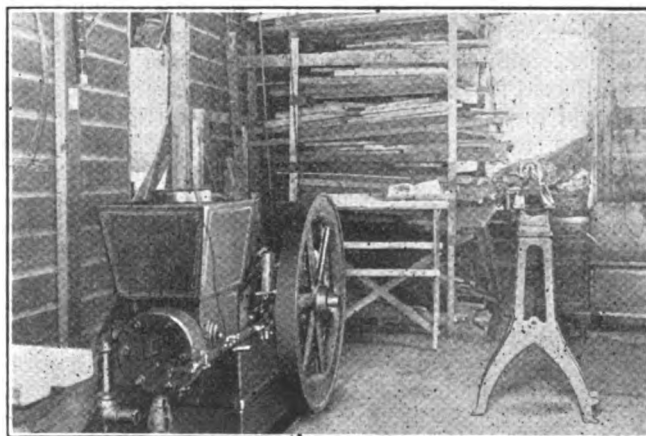
you in a few words just what our plan is for handling this subject and what you may expect.

Aside from this introduction there will be six subdivisions or chapters as follows, "Purchase & Installation," "Cooling System," "Lubrication and care of Engines," "Ignition," "Carburetion," and "Compression."

These chapters are well named, under the first one some valuable hints to be observed in the purchase of an engine, how to make the foundation, how to unload and set the engine in place, in fact everything necessary for a person to know to receive a new engine and put it in position and start it on its life work will be found in this chapter.

The Chapter on Cooling Systems will take up all the different cooling systems and explain the different parts, giving you the benefits derived from inspecting hundreds of engines in actual operation.

The same can be said of all the chapters, they will take up all the different things which should be considered to make these things simple



A GOOD LOCATION FOR THE GAS ENGINE



and handle them in such a way, giving you the results of different observations in the field to illustrate the points intended to convey.

The excuse for writing this is also very simple. The repair department head of the institution for whom the writer worked asked him one day as follows: "Why don't you write a book which will make the gas engine as simple to us as it is to you?" This question is what started the thought on this book, and how well the work has succeeded remains to be seen after you have read it and passed judgment upon it. An outline of what is here given was prepared and presented to the repair man for his approval, which was heartily given, then the completed work was presented and it is the result of his question and approval of what was produced that the work is presented at this time and in this manner.

Buying and Installing an Engine

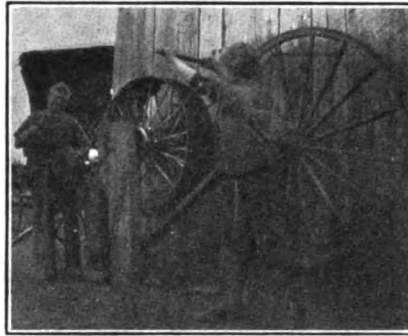
In the purchase of an engine, do not get in a hurry, or jump at conclusions, get all the information you can about all the different standard makes of engines. Make up your mind that all engines have their strong and weak points and buy the one which presents to you for your particular service the largest number of strong points.

Study the different kinds of fuel that are to be had in your immediate vicinity, the prices of each, the efficiency of each, the probable length of time these fuels can be obtained and the relative prices which will probably be asked for each. After you have decided on the fuel which will be the most efficient and the easiest procured and also the most economical, you are about ready to consider the purchase of the best engine you can find to handle this particular fuel.

When you have decided what engine you will buy, the next thing to consider is about what amount of power you will want that engine to produce, taking into consideration the different machines you will probably add to the plant which this engine is to run for the next few years. After you have decided the number of horsepower it will take to pull your load, allowing for the increase of machines which you expect to put in, then allow about 20% for surplus power and you will be about right. The reason for this surplus power is that an engine worked right down to its limit will not stand up nearly so well as one that has "power to burn" as the old saying puts it. It is on the same principle

that a horse will last much longer on a medium load than if he has all that he can do all the time.

Another thing to be taken into consideration in the purchase of an engine is the place where it will have the work. If you have plenty of floor space, you will probably consider a horizontal engine, or one in which the cylinder is level. If your floor space is limited and you have plenty of room other ways you might want to consider a vertical engine, or one in which the cylinder stands on end. There is very little difference in the efficiency of the two types of engines. Of course you will find people who would much prefer one kind to the other, but you are to use cold facts in the purchase of this engine, as you are the one who will



A POWER NOT DEPENDENT UPON
GASOLINE

pay the bills and it will be your loss if you make a mistake.

The most important thing of all has been purposely left until the last. How quick can I get repairs, and can I get expert help readily if I should need it? This is the all absorbing question in the purchase of an engine. Back of this question lies the efficiency of your engine. The time is sure to come when you will need new parts, and the time may come when you will need some help in applying these parts. It is not a matter of first cost of an engine, but what it will do for you and how little time will it have to remain idle while waiting for repairs when they are needed. The loss of the use of your engine a few days at a time while waiting for these things will soon absorb what you thought you were saving by purchasing a cheaper engine or one which has no repair department where you can get the repairs promptly.

You will probably go to the warehouse to look at the engine before purchasing, in which case you can ask the salesman to furnish you the templet and anchor bolts which

belong to the engine. By the templet we mean a small wooden frame made to fit the bottom of the engine frame with holes in it to match the holes in the bottom of the engine frame. By the anchor bolts we mean the bolts which are to be fastened into your foundation to secure the engine to the foundation.

You are now ready to begin to figure on the foundation for the engine. If your other machinery is already in place the only thing you can do is to figure out where your pulley wheel will be and make your foundation accordingly. If the other machinery is to be put in place after the installation of the engine, it is better to set the engine in the very best position you can find for it and arrange your other machinery accordingly. The engine is to be the life of your plant, and as such should have the best position.

We will give you an ideal installation of an engine, and the nearer you come to this the better service you will get from your engine. It should be placed in a clean dry room with as much light on all sides of it as can be had. It should be so arranged that you can walk freely on all sides of it for the purpose of inspecting it and caring for it as you will learn later on. If it is at all possible everything else in the shape of machinery should be kept out of the engine room. By all means keep all dust, especially dust from emery wheels and grind stones away from it. If it is not possible to eliminate the dust from the room, entirely, have the intake pipe run outside of the building or at least so arrange it that you get absolutely clean air to mix with your fuel. If you allow any dirt or grit to go into the cylinder in this way, the inside of your cylinder and the rings on your piston will suffer undue wear.

The arrangement for your cooling system should also be considered as the cooling system is very important. If the engine is in a basement where the frost will never reach the water jacket, almost any form of cooling system will answer, but if there is danger of frost an ideal way for getting away from all freezing is to dig a hole in the ground for your cooling water and have the hole deep enough so that the pump can be placed below the frost line, then drill a quarter of an inch hole in the water pipe just above the pump. The object of this hole is to allow the water to drain from the cylinder jacket automatically every time the engine is



stopped. When the engine is started the pump will immediately begin raising water to the cylinder, where it will pass through the water jacket and back through an overflow pipe from the top of the cylinder to the cooling tank. By having this tank under the ground it will not be necessary to have it so large as the ground will assist in keeping the water cool. An old well, cistern or any kind of a reservoir or tank that will hold water is all that is necessary for this kind of a cooling system. The different kinds of cooling systems will be taken up in that chapter and thoroughly gone over until you fully understand them.

We have decided where the engine is to be placed, the next thing is to make the excavation for the foundation. The foundation should be about three to six inches larger at the top than the base of the engine, according to the size of the engine. It should extend out in all directions at the bottom until it is twice as long as the engine base and about two and a half times as wide. The deeper the better, even down to solid rock. The more solid this foundation is the better service you will get from your engine.

The anchor bolts should now be placed in position as near the place where they should be as can be determined by measurements. The nuts should be screwed down far enough to allow the template to be placed on top of the nuts for the purpose of holding the anchor bolts in proper position to receive the engine base. It will be necessary to build a form to hold the concrete, of which the foundation will be made, in proper position until the cement sets, which generally requires three or four days; this form can be made of boards to give the foundation the proper shape when completed.

It is well before going further with the foundation to secure a quantity of scrap iron, woven wire, castings, buggy springs, chains, in fact anything which will add to the strength of the foundation can be worked in with the concrete to good advantage.

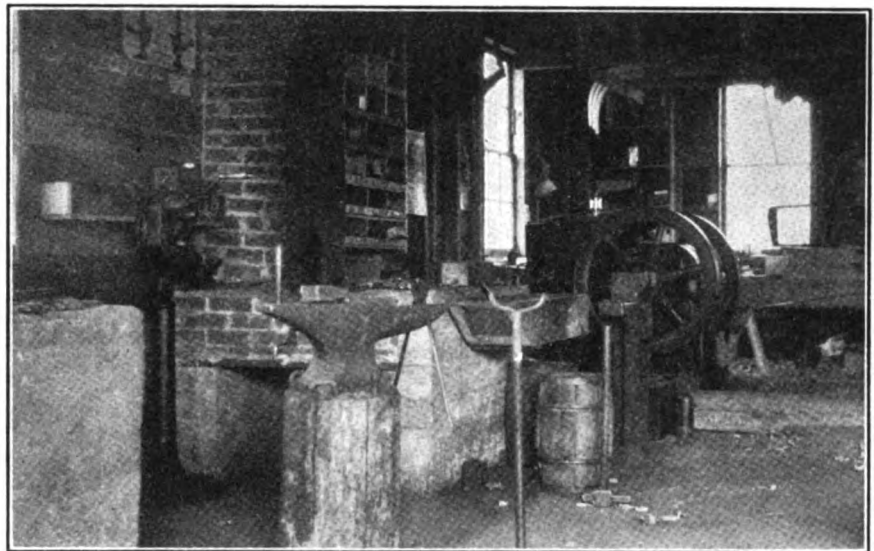
A sufficient amount of fine rock or gravel, sand and cement should now be secured of which to make the concrete which we will put into the form and make our base or foundation for the engine. This should be mixed about in the following proportions: 2 wheelbarrows of crushed rock, 1 wheelbarrow of fine sand, and a 100-lb. sack of good cement mixed with sufficient water to make

it handle nicely. This can be mixed all at once or a small quantity at a time until the form is full, but the packing should be continued, so that the surface cannot harden between layers and form a crack. The scrap iron is to be distributed around through the concrete to prevent it from cracking and to add to its strength. After the form is entirely full it should be covered to prevent injury and allowed to set for at least three days, (a week is better), before placing the engine upon it.

The foundation completed we are now to give our attention to the unloading of the engine from the car. Before paying the freight on the engine request the Railroad agent to go with you to inspect the engine to see whether it has been damaged in

to handle the engine is important. If you can secure a large heavy flat top dray wagon with low wheels and no springs you will have about the best equipment you can get for this purpose. If this kind of wagon can not be secured the next best should be had. A common farm wagon with the box removed and the space between the standards filled with ties or other strong timbers will do very well. Place the wagon in the best position, unhitch the team from it and chock all the wheels firmly so that it cannot move.

You will no doubt find the engine firmly bolted to a pair of heavy skids or timbers to facilitate the handling of it. By placing a couple of short pieces of about two-inch gas pipe under these skids the engine



IN THIS SHOP THE GAS ENGINE IS LOCATED BESIDE THE FORGE

any way in shipping. If any damage is found, request the agent to make proper notation on the freight bill. When this is done you can go ahead and unload the engine, and file your claim for damages and make the adjustments later. It is very necessary that any damages be noted on the expense bill before the engine is unloaded in order to make your claim of any value.

We are now ready for the actual job of unloading the engine. The real job connected with the installation is about to commence. We will take it for granted that this is a heavy engine and is in a separate car, which of course is set on the team track where you can get at it from either side of the car. You will next decide on which side the unloading can be accomplished with the smallest amount of risk.

The selection of a wagon on which

can be handled on level surfaces very easily by the aid of a pinch bar, which you can secure from the agent of the railroad company by asking for it.

The railroad agent is supposed to furnish you with suitable timbers for handling the engine. You will generally need a couple of about 3x12 or 4x12 boards such as are used between the rails at railroad crossings, and which can generally be easily secured from the section foreman. Do not accept anything but sound timbers of sufficient strength for your use. An incident comes to mind here where one of our experts was sent out to unload a 20-horse power engine for an elevator at a small way station at which the facilities for such work were anything but promising. The timbers furnished him were not of sufficient strength to carry the engine. He



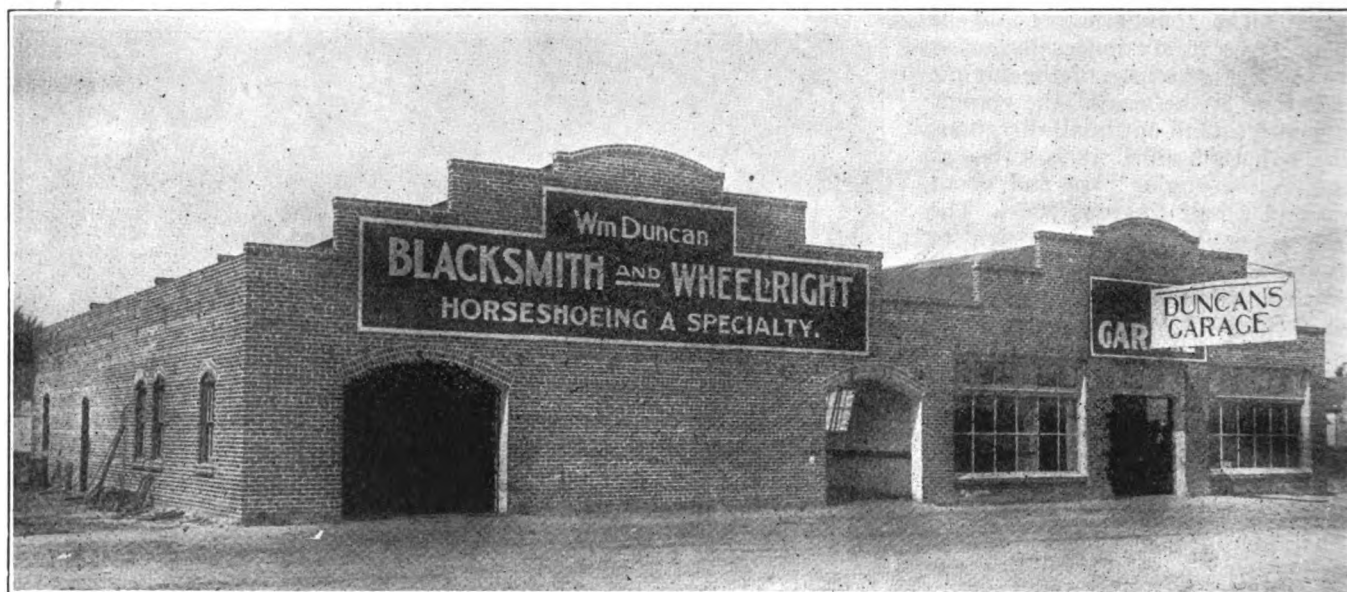
refused them. The agent informed him that was the best he could do. The expert commenced his work. Everything went nicely until the engine was about half way between the car and wagon, when one timber gave way landing the engine bottom side up in the mud. The expert went to the depot and informed the agent of the accident and ordered a new engine by telegraph. This engine having only a short distance to go was there the next morning, and the railroad company sent along in the car with it suitable timbers for handling it. This one was unloaded and placed in commission without incident. The railroad company had done with the second engine what they should have done with the

use your rollers on them to move the engine, but if there is any incline at all do not use the rollers, as when once a heavy engine is started down an incline it is next to impossible to stop it. If the incline is at all steep a strong rope or chain should be provided and fastened to the engine and put around some strong part of the car, an axle or one of the rails of the track will do. Above all things take plenty of time and figure out what each move will do for you before you make it. It is better to take a little more time and do things right and have a perfect engine than to be in a hurry and have a broken engine which will always be an eye sore to you and a reminder of your hurry in unloading it.

the ground. Fasten the wagon again securely before unfastening the engine, and again take off the team. You are now ready to start the engine on its final journey to the foundation. This should be on a gradual incline as is possible, even though it requires a little more time.

It will be necessary to place the engine on the foundation on top of timbers high enough to allow it to clear the anchor bolts. Place the templet on the bolts on top of the foundation, as it is always wise to have a cushion of wood between the engine frame and the concrete foundation. It helps to deaden the vibration of the engine.

A caution may well be expressed here and that is with reference to



MR. WILLIAM DUNCAN'S SPLENDID ESTABLISHMENT IN CALIFORNIA. HE BELIEVES IN GOOD SHOPS AND READABLE SIGNS TO BOOST HIS OWN BUSINESS

first. The object in giving you this information is to protect you from unnecessary damages and possible injury to yourself or some of your helpers. A few days after that the railroad company wrecking crew in passing by this place returning from work on a wreck, picked up the damaged engine, returned it to the factory free of charge and it was rebuilt, the company sending a bill for the rebuilding to the railroad company, which was paid without a word. The railroad company was at fault in not furnishing proper facilities for unloading, which they are compelled by law to do.

This could be included in the paragraph above but we hope to impress it more firmly upon your mind by making a separate paragraph of it. If the timbers running from the car to the wagon are level you can

The engine should now be fastened to the wagon with strong ropes or chains in such a way that it cannot move, after which you are ready to attach the team and start for the place of installation. Before starting on this trip go over the ground and select the smoothest route possible, avoiding all rough crossings and sidling places in the road or street. Place a competent driver on the wagon, take your place on the ground behind the wagon and watch everything, giving your signals to the driver so as to keep him under your control during the entire journey.

When you arrive at the place where the engine is to be installed, take the time to dig a couple of sloping trenches deep enough to allow the wagon to settle down until the axles are almost if not quite on

the top of the foundation. The foundation top should be perfectly level and the wood template rest level upon it.

When the engine is placed in position on the foundation put a nut on each anchor bolt and screw it down until it rests firmly on the frame then take a heavy wrench and screw each nut down a little at a time until all are as tight as you can get them. After the engine has run a few days you will find that you can take the same wrench and tighten all these nuts more which of course should be done. If you have followed all the instructions closely and have done the best you could, you will have a foundation that will outlast either you or the engine.

You are now ready to connect up the wiring of your ignition system which you will find thoroughly



explained in the chapter on "Ignition."

It will also be necessary to refer to the chapter on "Cooling Systems" to get the information necessary to give you the best cooling system for your engine. Paragraph 9 of this chapter gives an ideal cooling system if you are situated so as to use it.

When your installation is complete, all wiring and piping necessary for the ignition and cooling systems put in place you are ready to prepare to start the engine. You will of course see that there is fuel in the tank, a few words in regard to the installation of the tank might properly come in right here. If it is at all possible, place the tank outside of the building and at least two feet below the surface of the ground connecting up the overflow pipe to the bottom of the mixer and bear in mind all the time that this overflow pipe must not have any low places in it, but must have a gradual drain back to the fuel tank, the reason for this is to allow the air to go in and out of the tank through this pipe as the fuel is taken out of and put into the tank. This overflow pipe by proper installation can be made to take the place of a vent pipe. The supply pipe should be laid in the same way being especially careful in this pipe line to have no leaks. A very small air leak will cause the fuel pump to fail to deliver the proper amount of fuel to the mixer. These matters will be gone into more thoroughly in the chapter on "Carburetion" of which they are a part.

The engine should be "turned over" a few times before making any attempt to start it to see that everything is working freely. The needle valve can then be opened to the position marked "start," the air damper turned square across, this is done to give a richer mixture that will absorb the air which is already in the cylinder. Turn on your ignition system, turn the engine over a couple or three times when it should start. Be sure that the valves are working freely, especially the intake valve as no explosion can take place until a charge has been taken into the cylinder. Just as quickly as you can after hearing the first exhaust, open the air valve and turn the needle valve to the running position. The engine can be run a few minutes before the cooling system is placed in operation, but not after the cylinder is too warm to bear your hand on the cylinder head. If you have connected up the cooling sys-

tem as directed in Paragraph 9 it will take care of itself after it has once been started, but care should be taken that it starts properly at each starting of the engine. An engine can be ruined in a few minutes by the failure of the cooling system.

It is best to allow the engine to run without a load for an hour or two, watching carefully for any knocks or odor as of burning oil or anything which you do not understand. Don't take any chances it is much easier to stop the engine and start it again than it is to supply new bearings. You can touch most of the bearings with your hand while the engine is running and in that way detect any heating in time to prevent burning out the bearing. Do not get alarmed if any one of the bearings should get warm, or even hot, stop the engine and allow the

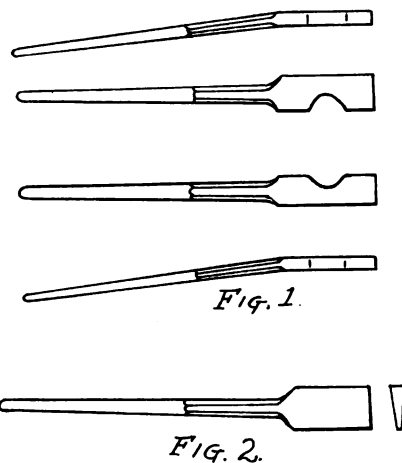


FIG. 1 SHOWS THE STYLE OF CUTTERS FOR COLD WORK; FIG. 2 THE KIND FOR HOT WORK

bearing to become thoroughly cool, even to allowing it to stand over night if possible. When started the second time the heating will probably not occur again, but if it should appear again it will be necessary to loosen the bearing a little. Full directions for this will be found in the chapter on "Lubrication and Care of Engines."

If your engine runs for an hour or two without showing any bad signs it will probably give you good service under a load. You are now ready to attach the load, but be on the lookout for a day or two until everything gets set to its position and in perfect running order. Most engines are provided with a friction clutch of some kind attached to the pulley wheel which makes it easy to disconnect the engine from the load, only a slight movement of the

clutch lever being necessary for this purpose.

(To be Continued.)

EDITOR'S NOTE—This is the first installment of Mr. Hobbs series of articles on the Gas Engine and its Installation, Operation and Care. The next installment will explain the cooling systems used on the gas engine and contains several practical suggestions that will prove helpful to gas engine operators and owners.

Cutting Stock Under a Steam Hammer

JAMES CRAN

While the smaller sizes of wrought iron and soft steel bars, say up to two inches round or square and one by three inches flat stock, may be cut cold under a steam hammer by using tools of the style shown in Fig. 1, it is better and safer practice to cut larger sizes hot.

By referring to the engraving where top and lower cutters for round stock are shown, it will be noticed that the handles are bent side ways about 15° to allow of them passing each other while in use. it will also be noticed that the notch in the upper cutter is much deeper than that in the lower one. This is to allow their edges to overlap. When they are in use and the stock to be cut placed between them. They will make a cleaner shearing cut if the edges are slightly beveled. Tools for cutting square or flat stock are made on the same principle only the cutting edges are straight. When using tools of this kind under a steam hammer the ram ought to be lowered carefully until the upper die has a bearing upon the top cutter sufficient to level it before a blow is struck, otherwise, it is liable to be wrenched from the hand using it and hurt either the workman or some one near by.

Cutting Hot Stock

One of the best methods of cutting hot stock under a steam hammer is to use a hack or hot cutting tool of the shape shown in Fig. 2.

It will be noticed that both the edge and top of this tool are perfectly straight and it is used by first driving in the thin side to a certain depth on all sides of the piece being cut after which the cut is completed by using the other side of the tool which is wider and removes all rags and burs that have been raised by using the narrow edge, leaving both the piece of stock and the piece removed from it clean and square on the cuts.

In cutting round stock with a tool as here described it should rest in a V block with a more obtuse angle



than those in general use. Say 120° during the operation this reduces flattening of the sides of the bar to the minimum.

How Many Tons of Coal Will a Bin Hold?

W. F. SCHAPHORST

To find the number of tons of coal any rectangular bin or pocket will hold, use this chart. Just lay a straightedge across a couple of times and column C immediately gives the tons capacity.

For example, How many tons of coal will a bin hold that is 10 feet high (column A), 10 feet wide (column E) and 20 feet long (column D)? Do you see how it is done? Very simple, indeed. Connect the height with the width and locate the intersection with column B. Then, from that point of intersection run over to the length and column C tells us that such a bin has a capacity of almost 55 tons.

This chart is good for either anthracite or bituminous coal. In general, anthracite is a trifle heavier and the chart may run just a bit low for that coal, and a trifle high for bituminous, but for all practical purposes the chart will give good, close results. It is based on the average weight of many different coals mined in the United States.

2,000 pounds of coal per ton is the basis of the chart.

Where the bin is square, a single straight line will do the trick. For example, if the dimensions are 10 by 10 feet a single straight line will show the capacity to be close to 27 tons. Try it yourself and try several other problems. You will soon "catch on" and will use no other chart, nor will you ever care to do any "long-hand figuring" again.

The Right to Charge an Advanced Price Without Previous Notice to the Customer

In these days of rapid and unexpected advances in all commodities, the following case should strike a responsive chord:

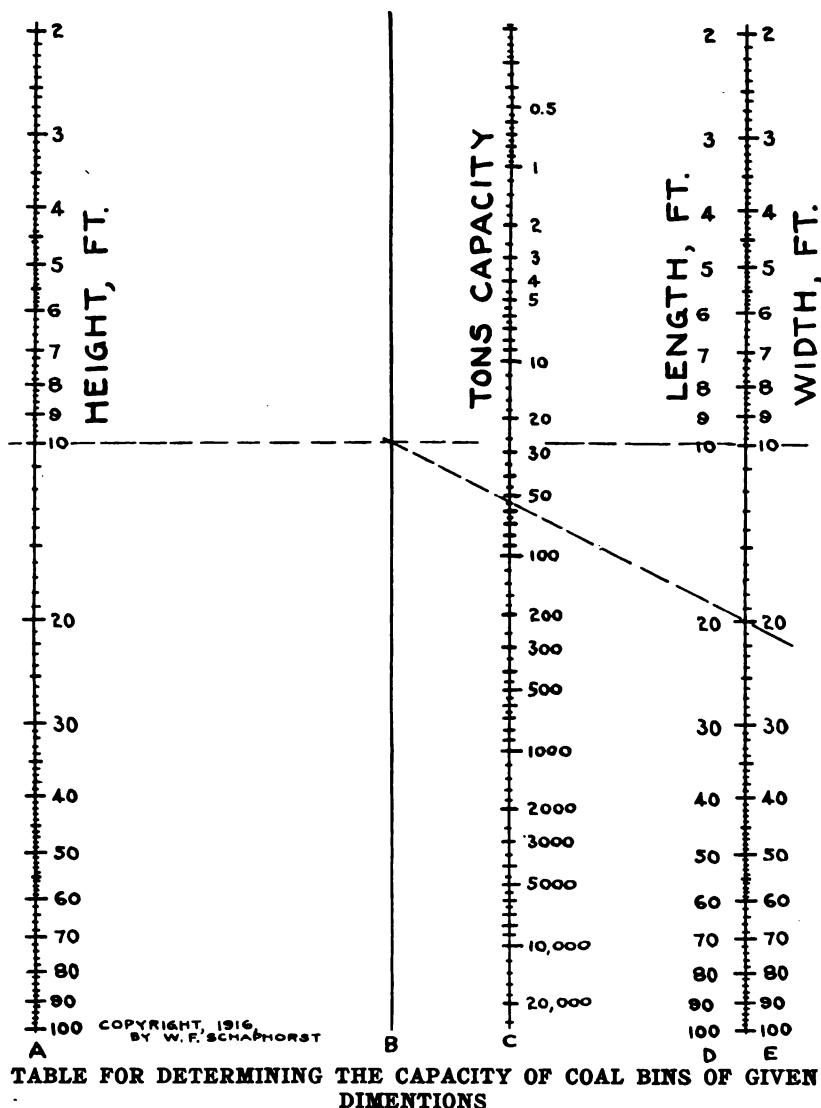
Columbus, Ohio.

For several years I have been dealing with a firm of Cleveland, Ohio, jobbers, buying the general line, among which is a line of staples, on which the price has not varied in a long time. For as long as I can remember the price has been the same. The last order which I placed was placed as usual with the salesman who calls on us regularly. He said nothing about any advance in price, but

advised me to increase my order, as the market might advance. He said, however, that he did not expect it to advance in the near future.

The goods were duly received and also the bill. I did not have time to check the bill up for a few days, and found then that the price on the line of staples I refer to had been advanced nearly 25 per cent. without notice to me. I took the matter up with the firm, but they refused to adjust the matter, saying that all wholesalers had advanced the price. It was too late to send the goods back because I had used some of them. I wish to

of doing business! Many manufacturers and jobbers print on all their business stationery and their order forms a line reading: "All prices subject to change without notice." Any seller who has put this wording on his stationery, if it is conspicuous, can raise his prices without notice to a buyer, and if the buyer places an order without inquiring, and afterward finds the price higher, he must pay it if he keeps



know if I am liable for the advanced price, as I was charged same without notice.

E. R. K.

As I said before, this is vitally important just at this time, because all kinds of commodities are advancing, and the chance is that many more readers of this department may encounter this problem.

Whether a buyer who places an order relying upon a price previously quoted him, is responsible for a higher price, no notice of the advance having been given, depends on several factors.

First, what is the seller's method

the goods. He can, of course, return the goods, but must do so promptly.

Even if the seller does not use the notice referred to, it may be a custom of the particular trade to advance prices without notice. If this is so, the buyer is bound by it and could not object to an advance without notice.

If the seller has not adopted the blanket notice, "all prices subject to change without notice," and there is no custom of the trade about it, then in my judgment, he could not advance the price without notice.

Perhaps I should qualify that. If the buyer had been buying a certain thing regularly every week or every month, and the price had for a considerable period been stationary, then it would be the duty of the seller, before filling the current order, to get confirmation of it at the advanced price. If he shipped the order and it was taken in and used by the buyer before the bill was sent, the buyer, in my judgment, could refuse to pay more than he had paid before.

This same question was asked me some time ago by a retail merchant who had bought some goods and had found the price higher than he had paid the last time. Inquiry, demonstrated that the order on which the price had been advanced was the first for over two months. The price two months before had been so much, and the buyer expected it to be the same as his last order, and did not inquire. It proved to be 33% per cent. higher when the bill came in. The buyer had to have the goods quickly and he therefore used them, but objected to the charge. I advised him that his objection was not well founded. Where goods are bought *infrequently*, there is no connection between the transactions, and it is decidedly incumbent on the buyer to ask the price when he buys. He has no right to assume that it has not meanwhile changed. In such a case the buyer would have to pay whatever the price was.

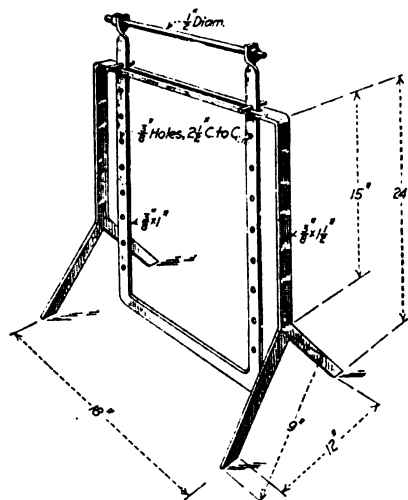
There is still another factor which ought to be discussed, and it is present in the case cited by the Ohio correspondent, viz., the effect on the situation of a salesman's acceptance of the order without notice—perhaps without knowledge—of any advance. If the salesman has authority to actually accept orders on the spot—his previous conduct would decide this—then the former price governs if he accepts an order without changing the price, even though he didn't know of the advance, as seems to have been the case with the Ohio salesman.

But if the salesman had no authority to accept the order, but simply was to get it and forward it to his firm, they to pass on it, then what the salesman did or said has no bearing on the case.
(Copyright, by Elton J. Buckley.)

Stock Rest for Long Bars

In the accompanying illustration is shown a stand for supporting long steel, rods, etc., in the blacksmith

shop when working with them at the forge or anvil. This stand has the advantages over the many "one-legged" forms used, of being more stable and considerably wider, and yet it is simple to construct. The supporting piece is made of $\frac{3}{8} \times 1\frac{1}{2}$ -in. flat iron, the yoke of $\frac{3}{8} \times 1$ -in. flat iron. The latter is passed through two slots in the horizontal part of the supporting piece before the ends of the yoke are twisted at right



STEEL STOCK REST FOR THE SMITH SHOP

angles, as shown, and the rod passed through these ends. By means of the holes in the vertical members of the yoke and two nails, the support can be held at any desired height.

Notes on the Theory and Practice of Hardening

T. WEST.

(English Mechanic.)

Blades of a Pocket-knife

On buying a pocket-knife, it is frequently found that the blades lose their edges very quickly, even when only used on one's finger-nails, or for sharpening lead-pencils. When I was a boy I could get a good knife for half-a-crown (about 65 cents). Now, alas! double that price brings a disappointment in most cases.

It is possible this may be due to the use of machines for hardening and tempering small articles, which I will briefly describe; and it will be seen, from the principle of the machine designs, that the degree of heat attained by the articles about to be quenched is not very certain. Therefore it is kept higher than will turn out the best work, lest it be too low to give a hardness, and the temper is afterwards drawn to a darker colour than would be needed if hardened at the proper heat of just above calescence. The hardening machine

consists of a drum mounted on a shaft which has a spiral division-plate like an archimedean spiral pump. The drum, shaft, and spiral are contained in a chamber lined with firebrick. The spiral is fed automatically and continuously at one end with the articles to be hardened, and these pass along the revolving drum by the action of the spiral, which revolves with the drum, as a fixture to it. The containing firebrick chamber is kept at a bright red heat, and the drum, spiral, and contents receive this heat, the fuel being coal-gas. The articles are thus made of a red heat in excess of their calescence-point as they travel from inlet end of drum to outlet end, where an opening causes the articles to fall into a vessel of cold water. The water is changing all the time by fresh cold water supplied through the bottom of the vessel, the warmer water over-flowing at the top into an escape-pipe.

The speed at which the drum revolves is the means by which the heat of the articles is regulated, as, of course, the slower the drum revolves the longer these are in it, and therefore the hotter they get. The speed of drum is controlled by a friction-cone. I have pointed out in a previous article the vital influence on the toughness of hardened steel that is effected by the degree of temperature at which it is quenched, and one can easily suppose how far the exact degree of heat so necessary to the best results is attained by these means in the hands of the usual workman. The hardened articles are next polished in a "rocker" by shaking them about in contact with boxwood turnings and an abrasive.

The tempering machine is constructed on a somewhat similar principle, only that, with the articles to be tempered, heated sand is poured into the drum, and surrounds them as they travel through the machine. The capacity of output with these machines is considerable—as much as 150-lb. of light-weight articles per hour; quantity doubtless, quality doubtful. As the farmer's wife said when told her husband could kiss her fifty miles away on the telephone, "I don't call that no 'provement at all; gie I th' ole-fashioned way."

The blades are mostly drop-forged, and this does not give quite the fineness of grain that a hand-forged blade has, if made by a good steel-smith, and therefore not quite the toughness. Hence, as compensation,



a darker temper-colour has to be used. It is quite possible to improve the temper by retempering properly; but we cannot improve the grain, as of course reforging is out of the question.

To retemper a pocket-knife blade, take the blade out of the handle; prepare the molten bath as described in a previous article. As soon as the bath is red-hot, plunge the whole of the blade into it, to remove the previous temper; allow it to cool to black-hot. See that the bath is only of a dull red, and, if too hot, cool it by putting the end of a thick iron bar into it. When of the proper heat, plunge the whole of the knife-blade into it. Being so thin, it will take the temperature of the bath almost directly. As soon as it is at bath's temperature, remove it and quickly quench it, being careful to hold it vertically, for if held at an angle to the face of the water which is more acute one side than the other, the blade will warp. Test for hardness with a file, and if not hard, raise heat of bath a very little, and repeat operations. Whilst the steel is in the bath the air is excluded from contact with it, and the moment's exposure in passing from the bath to the quenching vessel will effect but little decarburisation, so a few heatings will not do much injury, for as we cannot have a piece of steel of the same kind as the blade to make a test-rod, we have to test with the blade itself to get the right quenching heat. If several blades from the same handle are to be retempered, put them all in the bath together, testing heat with one only, as when that is right the other blades will be also. To temper the blades, the molten tin or the heated oil-bath must be used. Proceed as directed in previous article, and draw the temper to a dark brown, or even slightly shot with purple.

As this temper would break with a side-strain, we have to support the edge by lowering the temper of the back, but without lowering the temper of the edge. To do this, carefully drive the blade, half of its width, into a block of lead by light taps with a hammer. Melt some lead in a ladle large enough across to take the blade longways. As soon as lead in ladle shows a faint redness, carefully dip the back of blade into it, not allowing the hot lead to touch the block of lead holding the blade. Take it at once from the hot lead, and instantly dip the whole in water, without removing the blade from the block of lead. The mere contact of the hot lead is sufficient to untemper

the back of blade, and if kept in the hot lead the heat may creep towards the edge, despite the protection of the cold lead.

A blade tempered in this way is much superior to one of those that are tempered at the rate of 150 lb. per hour. Of course, if one knew the calescence-point of the steel, and had a pyrometer to gauge the heat of the molten bath, so as to quench when the blade was at its calescence—knew the percentage of carbon in

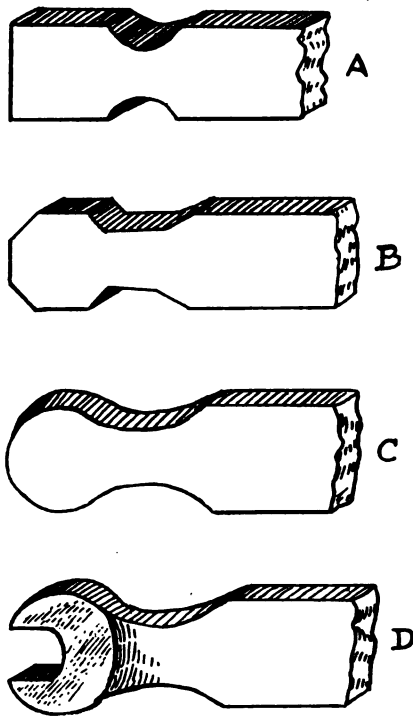


FIG. 1—THE VARIOUS STAGES IN FORGING AN OPEN END WRENCH

the steel, or its "grade," as it is called—then one could temper to exactly the right colour, and a still superior knife would be the result.

Making Tools From Worn Files

It will be seen from the table previously given that the steel of which files are made is of a much higher carbon percentage than is the steel of most of the other tools in use, so that worn files are not an ideal material for many purposes; but as one gets a lot of these, the temptation to use them up is great, and I propose to point out a few of the precautions necessary when employing these as material for other purposes. Before heating an old file, if it has lain by and got rusty, the rust should be ground off entirely, or else the oxygen in combination that forms the rust, or red oxide, will combine with some of the carbon content of the steel and partly decarbonize it, exactly as the oxides around cast iron act in the process of making malle-

able castings; and as the decarbonization is much greater at the surface than at the interior, one would get a tool harder inside than out, and the colour-temper be deceiving, as grinding the tool once or twice may produce an edge that snips off, although the first edge stood very well. A file, or any other piece of hardened steel, should be made a dullish red-hot, and allowed to get nearly cold before being forged, to avoid cracking, when hardened from internal strains. All the teeth of the file should be ground completely out, or the hammering whilst hot is very likely to cause the cuts forming the teeth to penetrate further into the steel, and, although not perceptible at first, cause the tool to break in use at the place where the cut has penetrated.

File-steel bears heating less than tool-steel in general. It burns at a lower heat, perishes faster—i. e., decarbonises—nor will it stand hammering so hard. Its calescence-point is lower, so that it must be quenched at a darker red, or its toughness will be depreciated. In tempering, the colors must be "drawn" to a darker shade than those in previously given table.

For screwing-taps, springs, tools with a thin edge, such as carpenters' chisels, fine-edged turning-tools, etc., it is very unsuitable, often giving more trouble than it is worth. It may be used for cold or chipping chisels, if the cuts to be made are not heavy; screw-plates, ordinary screwing-dies, roughing-out, turning, or planing chisels, but not parting or screwcutting chisels. For scrapers it is a very good material, particularly if quenched in mercury and left dead hard. A "three-square" file, ground off flat at the end and left dead hard by water-quenching, or, better still, mercury-quenching, forms a capital *hand* tool, when used with a hand-rest in the lathe, for truing the centres, if the are kept lubricated with a half-and-half mixture of paraffin and turpentine. Of course, the cut must not be a deep one, and the tool requires grinding often; but I have many times used such a tool for the purpose, in the absence of grinding appliance.

Tools made of files should be heated in a molten bath, tested for calescence with the tang of a similar file, and quenched as before directed for chisels. If to be tempered, any of the previously-given directions suitable to the shape can be employed. But it will be remembered that, owing to the high carbon percentage



of file-steel, the temper-colour must be darker for the different purposes than those given in the table.

Making Open End Wrenches Under A Steam Hammer

JAMES CRAN

While the making of wrenches in large quantities is unquestionably more economically accomplished by the drop forging process, than by any other means, there are times when a quantity of wrenches not sufficiently great to warrant the expense of making drop forging and trimming dies have to be made and still too great to be turned out with any degree of speed or accuracy without some special tools for the purpose. In shops where there is a steam hammer, wrenches can be turned out in reasonably large quantities by the use of tools which may be made by the blacksmith who is to make the wrenches.

After having tried various methods, the writer is of the opinion that the following is the simplest and most economical both in regard to the tools and the number of wrenches that can be turned out in a given time. Let us take for example an open end wrench for a $\frac{3}{4}$ -in. nut, which ought to be approximately the following dimensions: Width across jaws $2\frac{3}{4}$ -inches, thickness of jaws $\frac{5}{8}$ -inch, opening $1\frac{1}{4}$ -inches, length of handle from head, 12 inches, thickness of handle $\frac{1}{2}$ -inch with oval sides and round edges, width of handle at neck $1\frac{1}{4}$ -inches, tapering towards end. The stock preferably soft steel should be $2\frac{1}{2}$ inches wide and $\frac{3}{4}$ -inch thick.

The first operation in making a wrench of this kind is to break it down to approximately the shape shown at A. Fig. 1. This is done under the steam hammer, by using a pair of Spring swages with the edges of the impressions well rounded off as shown at A. Fig. 2. The next thing to be done is to work back the corners of the head to octagonal shape as shown at B. Fig. 1. The piece is then ready to be rounded up to the shape shown at C. Fig. 1, which is done in swages with a ball shaped impression as shown at B. Fig. 2. After the piece has been turned several times in the swages under the hammer it is removed and may get a blow or two on the flat to bring it to the correct thickness and width. Should the head contain a little too much stock it can be replaced in the swages which will

force the surplus metal back in the handle and be again flattened until the desired dimensions have been reached. With a little practice after the correct amount of stock has been determined a wrench head, all but the opening may be made at one heat.

Before proceeding further it may be well to take the ball swages in hand. These are made after the man-

driven together by the steam hammer, turning the ball at each blow until the edges come together. In bob-punching the heads of the swages care must be taken not to get them too deep, otherwise it will be hard to get a smooth impression. After the swages are cold they may be held apart by a piece of wood between the handles while all the sharp edges are removed from the

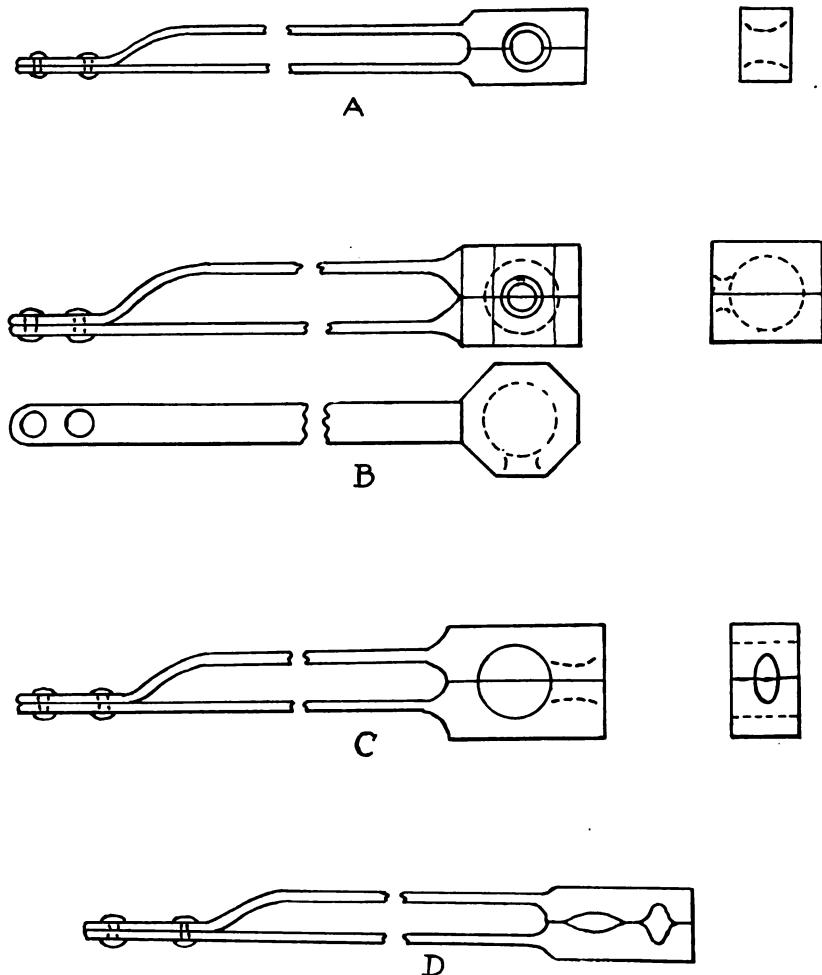


FIG. 2.—THE TOOLS USED FOR FORGING OPEN END WRENCHES UNDER THE STEAM HAMMER

ner of ordinary spring swages only the heads instead of being rectangular in shape, should be round or octagonal. After the heads have been roughed out and the handles drawn down to the required dimensions, a bob punch about $2\frac{1}{4}$ inches in diameter is driven into the center of each head after which the opening in the side is fullered in to nearly the required size, the handles are then shaped and riveted together at the ends, keeping the heads as near in alignment as possible. The heads are then heated and a ball, $2\frac{1}{2}$ inches in diameter with a handle, which has been previously turned up is placed between them in the impressions. The swages are then

impressions and these well rounded over to prevent the work sticking.

While what has been said applies to wrenches for $\frac{3}{4}$ -inch nuts; larger sizes can be made in the same swages by using thicker material and flattening out to the desired width after it has been worked to shape.

Another pair of swages that will answer the same purpose are shown at C, Fig. 2. These are rectangular and have the impression for the wrench head straight through the center with an opening in the end for the handle. In using this type of swage the stock for the wrenches is prepared exactly the same as for ball swages only it is not turned while being swaged. The difference

between the wrenches made in the different swages is that those made in the ball swages have round edges while those made in the swages just described have square edges.

To bring a wrench head to the shape shown at D, Fig. 1, a round hole may be punched and the opening completed with a chisel but what is preferable is a punch and die as shown in Fig. 3. The die is built up on a cast iron body, F, over which there is a tool steel plate or die, C. In this plate is an opening, the same as the opening of the wrench, only longer and round at both ends in this plate are inserted 6 locating pins, B, to insure the centering of the wrench over the opening between the die plate and the soft steel guide plate, E, which is exactly the same as the die plate. Between are two soft steel bars, D, just thick enough to allow room for the wrench head. This guide plate is removable to allow of the wrench being inserted and is kept in its proper position by the 4 guide pins, A, at the corners. These guide pins should taper to facilitate replacing after the wrench is inserted. The punch which ought to fit both the guide plate and the die, should be short enough and have sufficient taper to drop right through the die when it has been driven through the wrench by the steam hammer. The advantage of having two round edges is that when one side of it gets worn the other can be used.

After the various operations here described the handles of the wrenches may be drawn to the required dimensions but this is too ordinary an operation to need any explanation further and have to say that a pair of swages of the shape shown at D, Fig. 2, will facilitate and improve the work.

Fundamentals of Lathe Practice. Chucking—2

JAMES STEELMAN

The *mandrel*. (See Fig. 9). Sometimes the work is a hollow tube-like shell. There is no metal where the center holes should be drilled and countersunk. It is not unusual to turn such work on a mandrel—that is, on a longer or shorter cylindrical piece which is provided with proper center holes to enable it to be carried between the live center in the spindle and the dead center in the tail stock or is adapted to be carried entirely by some appliance on the spindle. It is usual to have the mandrel slightly tapered in order to

facilitate putting on and taking off work. This taper may cause the diameter to vary not more than 0.01 inch per foot of mandrel length. One may make his own mandrel of unhardened steel. This will answer for work that is not required to be very accurate. For high grade work, it will probably be much better to purchase a mandrel from a professional tool-maker and thus secure a high carbon steel mandrel accurately

number of sizes may be accommodated by the same mandrel. The stepped mandrel will resemble a cone pulley. If the hole in the work is quite large, a *collar mandrel* may be employed. In this mandrel, the full diameter may be provided only at the two ends, the intermediate portion being reduced in diameter. Consequently, contact between mandrel and work is limited to the round surfaces of the two collars. The appliance known as a mandrel should not be called an arbor. The mandrel carries the work; the arbor carries a cutting tool.

A mandrel need not necessarily work between centers. The work may be short and not too heavy to be carried by a mandrel which is secured either to the spindle or to the face plate and so made to rotate with the spindle. Such an appliance is really a chuck.

The *chuck*. Frequently the work is of such a character that it cannot be carried between centers. When this is the case, the ordinary chuck is frequently employed. This is really a vise. It is carried directly or indirectly by the spindle. Accordingly, the work secured in it is rotated and may be cut. Work having a rather large diameter and a short length will ordinarily be suitable for the chuck, provided it can be gripped externally or else internally and that the parts to be cut are properly accessible to the cutting tool. For example, the work may be a rather flat circular disc, one of whose flat faces is to be cut by the tool. Such a piece is advantageously gripped externally on the circular edge, leaving the face exposed to the operations of the tool. Some chucks have gripping parts which may be made to close in all together on the exterior edge, each gripping part moving inwards at the same rate. Similarly, the gripping parts of the same chuck may usually be operated simultaneously outwards so as to exert pressure internally on the work. Thus, if the work is a ring, one of whose faces is to be cut, the gripping parts or *jaws* may be expanded to hold the work from the inside of the ring. A chuck whose jaws operate simultaneously is a *universal chuck*. A moment's reflection should show one that some work will not be adapted to this equal movement of the jaws. That is, the work may be of such shape that the points where the gripping is to be done are *unequally distant* from the center. There are *independent-jaw* chucks which are so made

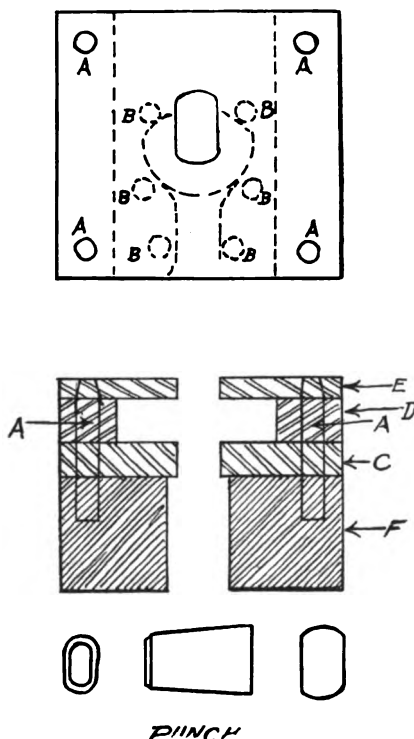


FIG. 3—THE DIE AND PUNCH FOR CUTTING THE OPENING IN THE WRENCH END

ground to size after hardening. The mandrel whether made at home or bought should ordinarily have at both ends a diameter distinctly less than the main body. The rounded ends of less diameter will be provided, each, with a flat surface. This flat surface is provided for the purpose of receiving the pressure of the end of the screw in the dog or other carrier employed to drive the mandrel. Where the amount of hollow work does not justify an assortment of hardened and ground mandrels, a special mandrel may be made for the work in hand. By taking a great deal of intelligent care, a pretty accurate mandrel may be made. The final cuts over the tapered surface should be very light. How to secure an accurate taper is a problem reserved for another article. Sometimes the hole in the work is quite short. In such cases a *stepped mandrel* may be used. In this way, a



as to permit the jaws to be moved independently of one another and so accommodate themselves to irregularities. There are also *combination* chucks, which are so made that they may be used either as universal chucks or as independent - jaw chucks. The universal chuck is a self-centering chuck—that is, it forces *circular work* to such a position that the center of the work is in line with the axis of the spindle. It is just as well for the workman not to take the self-centering for granted, but to test the work after it has been securely gripped, to make sure that the centering has taken place properly.

In adjusting work on any type of chuck using jaws, the operator should be careful to see to it that the jaws are not in the way of the cutting tool. The grip should be such that the work will remain immovable under the cutting operation. It may be tested to ascertain whether the face of the work is vertical by bringing the tool up to the face until it is barely in contact, and then turning the work and spindle by hand slowly round. If the face is really vertical, the contact will remain the same throughout the circuit. *The larger the diameter of the line of contact or near-contact, the more accurate will be the test.* To test the work to see whether it has been properly centered in the chuck, the operator may bring a sharp-pointed tool, properly secured in the tool post of the rest, up to the face of the whole and near to the point which is known to be the center of the work. When the spindle and work are not rotated, *the point of the tool and this central point of the work should remain together.* The operator should generally be careful to test work both for verticality of face and for central position.

A *face plate* (Fig. 5) is a circular disc which may be secured on the spindle to turn with it and which is provided with circular holes or slots or both for the purpose of affording a means for securing work to the disc. It differs from a driving plate in that the face plate carries the work directly or indirectly; while the driving plate is used not to carry the work, but to drive work supported between centers. The face plate is useful for holding work that is irregular or otherwise unsuited for the chuck. The work is bolted or otherwise secured to the plate, the holes and slots facilitating this. On very large lathes, face plates may be used which have T-

slots and other means than holes and the like. That is, big face plates need not have perforations. Securing the work on the face plate is a matter of skill and judgment. When done, the work should be immovable.

Sometimes, the work is so very irregular in form that it cannot be directly secured to the face plate.

FIG. 9.

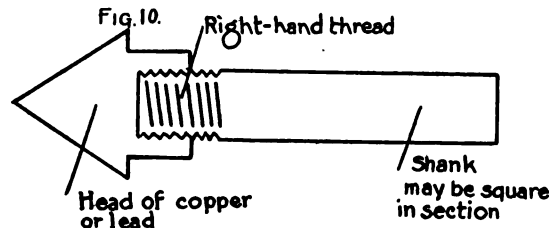
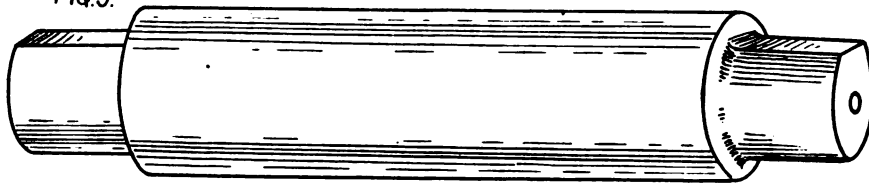


FIG. 9—A MANDREL AND AT FIG. 10 A LAP AS MENTIONED IN MR. STEELMAN'S ARTICLE

An *angle plate* is useful in many such cases. A typical angle plate has two leaves at right angles to each other, the whole being a single rigid piece. The leaves are flat and provided with openings in the form of slots. The work may be secured to one of the leaves and the other leaf secured to the face plate. Naturally, it is very necessary to see to it that the work is very secure on the angle plate and the angle plate very secure on the face plate; otherwise we may expect unsatisfactory or even dangerous results.

Sometimes one end of long work is secured by means of some type of chuck, the other end being arranged on the center in the tail stock.

A *steady rest* may sometimes be useful where work carried between centers is very long in proportion to its diameter. Such work is liable to bend under the pressure of the cutting tool. A representative steady is a device which may be secured to the bed of the lathe in a fixed position and which is provided with movable pieces which may be adjusted to bear loosely against the work and form a kind of hole in which it may turn. The object is to support the work at several points in its circumference without interfering with its rotation. The foregoing is a *stationary steady*. As the support is best given close up to the cutting tool, such a steady may need to be shifted from time to time. There is another type, the *traveling steady*. This is a similar device to

the other, except that it is secured to the slide rest and so follows the tool.

A word or two as to center holes may not be out of place. Sometimes, such a hole becomes injured through carelessness or otherwise. An imperfect hole may lead to inaccuracy of work. To restore the perfect form, a simple tool known as a *lap*

(Fig. 10) may be employed. This is a shank with a head at one end. The surface of the head away from the shank is given a convex conical surface of precisely the proper angle for the center hole. That is, if the angle of the center hole is just 60 degrees, so also must be the angle of the lap. The shank may be of steel, but the head should be of soft metal, say lead or copper. The head is made to screw onto the end of the shank. When the conical lead or copper head is rotated in the injured center hole and a mixture of fine emery powder and oil supplied between the two, the hole may be ground out to proper form. The threads in the head and on the shank should be right-handed.

Height of Work for Filing

For general work the top of the vise should be placed level with the elbow of the workman. On small and delicate work, the vise should be higher, so that the workman may more closely scrutinize the work and stand more erect. Heavy and massive work requiring great muscular effort should be below the elbow joint, as the operator stands further from his work; in this class of work it is desirable to throw the weight of the body upon the file to make it penetrate. In fixing the height of the vise the nature of the work and the stature of the operator should be considered if the principle is to be applied correctly.—*Exchange*.



Carriage Repairin' vs. Automobile Engineering

W. O. B.

PART II.

Automobile Engineering

Percy Stuyvesant Haskins Loring was a garage man of note—he could fix most any trouble that could get a motor's goat. And his garage was a wonder with its cement floor and wall; electric power did the labor, turned the lathe and drill and all. Here our Percy worked his think tank to the music of the "tin" that was brought by auto owners as their busses wandered in. More and more machines kept coming and the trade began to grow, so that dear old Percy realized he would soon grace Nabob's Row.

One day came young Astor Gotrocks with a racy car of red, stopped at Peerless Percy's Palace, honked his horn and thusly said: "Percy deah, the old cah's limping, look her ovah sharp an' good, give her a good ovah-hauling from her tank right to her hood." So our Percy told a helper to try out the Gotrock's car. "Run it to the village smith shop an' bring back that crank for Barr." "Then," said Percy, "go to Murray's, get that top for Smither's truck. Comin' back, you take the sand road over where McSwaggert's stuck. Pull him out and bring his car in and charge him seven-fifty-five. Now then jump and keep a-jumpin', show me that you are alive."

When P. Loring, auto expert, sent his bill to A. Gotrocks, he took care to charge each item—for he needed silken socks. "Rent is high," said Percy Loring, "Labor almost just as cheap, gas and oil and every minute cost me just an awful heap." But we used that car of Gotrocks so we'll need to ease a bit when we come to charge him for all the work we did on it. And then, too, I like pleased clients—do not like the one that hollers." So his charge for "examination" he put down at "seven dollars."



Heats, Sparks, Welds

If a smith doesn't know his costs, how can he tell what his profits are?

Let the other fellow boast a while—when you have nothing else to say.

No job can be checked over too often—we all forget something sometime.

Which of these speakers are you listen-

ing to—Old Man Howler or Hustling Bill?

How's your Herd? We've still got plenty of pink Buffalo stamps on hand ready to send you as soon as you say the word.

It's pretty hard these days to lose an account after keeping after the delinquent persistently and regularly—in fact, it's almost impossible.

Ready for the Fall rush? Tools in repair, machines in perfect order, shop ship shape? Better get busy so you can keep busy during the busy season.

Mr. James Mason, Forging Instructor at Carl Schurz High School, Chicago, was a visitor at our offices recently. Mr. Mason was on his way to New York City.

Satisfaction should be just as much a part of the job as the nails which hold the feet to the horses hoof. Like the nails satisfaction holds the customers to the shop.

Reading a trade paper on your trade will keep you posted on trade happenings. Are you keeping posted? A smith without a smith paper is like a forge without a fire.

Look out for the leaks. What? no leaks? how about bad accounts, lost charges and stolen goods? They all come out of the profit end of the business. Watch the leaks carefully.

One good thing about these days of high-cost-of-living is the necessity of tucking in a little real business between the war talk and bunk. The w. t. & b. is notoriously unreliable as a provider and meal ticket.

This is the last number of volume fifteen. This issue marks the end of fifteen years of THE AMERICAN BLACKSMITH. What a mighty procession of progress these fifteen years have seen! What has the next fifteen years in store for Our Craft?

Ten years ago the automobiles registered in the entire United States numbered 80,000. Today the yearly output of single factories exceeds that figure and the state registers account for twenty-five times eighty thousand. Are you doing auto work?

Smiles in the smithy mean dollars in the money drawer. Don't be afraid to carry a smile on your face when in the shop and an occasional hearty laugh is good for everyone. Then, too, it won't do a bit of harm to carry the smile and laugh home with you at night.

The trailer for the automobile is growing more popular each day. The farmer uses it to pull produce to town, the tourist uses it for tent and camping equipment, the merchant uses it for carrying extra loads and everywhere it seems to be meeting a need and want.

With the tales of merchant submarines and merchant air fleets as daily news, and with wireless marvels common place talk, surely this age is one of wonder and stupendous accomplishment. What can the future produce to mark the progress of time?

Does the cost of finding the cost of a job cost more than the job costs? If so you are binding yourself with red tape and it is most time to call time. The proper formula for cost finding is equal parts of cost accounting and common sense used liberally and applied often.

Hustling Bill Booster says: "The oxy-

acetylene plant with the auto, truck and tractor have placed a bigger opportunity in the smith shop than it ever saw before. It's simply a matter of grabbing the opportunity and working it hard. And the big money usually goes to the first grabbers?

Farmers in recent years have taken to naming their farms and names such as: "Hillanddale", "Valley View", "Willow Brook", "Windmere" "Hill Top" are among the names seen on barn, fence and even on elaborate specially made signs. And it is a commendable thing, particularly from a commercial viewpoint.

No! Why not? First thing you know you'll grow to the side of the shop then you won't know how to enjoy a vacation. Better slip off the apron and work togs for a few days, at least. Take the missus and kiddies along and then forget the shop for a while. It'll do you good and also help the missus and youngsters.

Old Man Cal Amity Howler says: "The automobile an' them thar tractors is goin' to be the death o' smithin'. Thar ain't goin' to be no hosses for the smith ter shoe an', thar ain't goin' to be no wagons for his tire shrinkin' ability ter practice on. So I guess it's 'bout time ter git back t' the farm agin, while the gittin' good."

Speaking of naming farms recalls a name evidently coined with a bit of sarcasm in its mixing. The farmer in question evidently could discover no distinguishing mark or quality about his farm—it was not on a hill, it was not in the valley, it was not beside a brook but just a mere farm, so he called it "Justamere Farm."

"How's the B. L.?" asked a friend the other day. Why, it's getting on fine, growing, prospering and making the knocker eat his words. You don't hear folks knocking the craft today as you did two or three years ago—well, that's the B. L. at work. If you aren't a member of the Booster's League, join now. Silently and solemnly pledge to boost for the good old craft of Tubal Cain and to answer the knocker's words and challenge.

How many items have you contributed during the past year? Have you been one of the hundreds of contributors to these columns? Every reader of "Our Journal" is expected to send in something practical for publication. We expect every reader to be represented at least once a year. If you haven't sent in something for publication during the past year better send in something now.

A binder will keep the numbers of volume fifteen clean, compact and handy. Better ask Our Service Department about binders for Volume fifteen—NOW.

The American Association of Blacksmiths and Horseshoers of Fayette County, West Va., was recently formed and the following officers were elected: Mr. Alonzo Zimmerman, President Mr. T. O. O'Dell Vice-President; Mr. O. C. Tamplin, Secretary; Mr. B. L. Bush, Treasurer. Constitution and By-Laws have been adopted and everything looks favorable for the continued growth of the strong, healthy association in Fayette County. Mr. Tamplin, Secretary of the Fayette County Association, will be glad to hear from any blacksmiths or horseshoers who are desirous of joining the new organization. Address him, O. C. Tamplin, Ansted, West Virginia.



Our Honor Roll

AND STILL THEY COME

More and more readers are taking advantage of "Our Honor Roll" every month and it is becoming more difficult each month to find a place on the list of Honor Subscribers. If you do not know what a saving you can make by taking advantage of Our Long-Time Rates look over the table of rates and see just how can save money and at the same time insure your subscription account. Sharpen your pencil and get down to actual figures and then get your name on this list of Readers who are paid up well in advance.

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Waddington Farm, W. Va.....	Mar., 1928	J. E. Ray, Minn.....	Mar., 1924
A. A. MacLean, Nev.....	Feb., 1927	A. Hulstrand, N. D.....	Mar., 1924
C. M. Adams, Conn.....	Jan., 1927	W. F. Riske, Wisc.....	Mar., 1924
Plateau Shoeing Shop, Colo.....	Dec., 1926	B. F. Selbert, Calif.....	Mar., 1924
John H. W. Schneider, Cal.....	Dec., 1926	H. Roeschwetter, Mo.....	Mar., 1924
J. Taylor, Calif.....	Oct., 1926	W. B. Briant, N. J.....	Mar., 1924
J. A. Buchner, Mich.....	July, 1926	A. Bosch, N. Y.....	Mar., 1924
H. Mitchell, N. Y.....	July, 1926	A. R. Johnson, E. I.....	Feb., 1924
M. Ebron, N. D.....	June, 1926	F. Jacobs, Ohio.....	Feb., 1924
D. Ackland & Son, Man.....	May, 1926	A. J. Perry, Illinois.....	Jan., 1924
H. Pirret, Ore.....	May, 1926	B. G. Walker, Calif.....	Jan., 1924
J. Sinclair, W. Australia.....	May, 1926	H. D. Erskine, Vermont.....	Jan., 1924
P. Sowa, Oregon.....	May, 1926	E. Fowler, Pa.....	Jan., 1924
E. P. Dugman, S. Australia.....	Apr., 1926	Breen & Son, Ireland.....	Dec., 1923
P. A. Peterson, Iowa.....	Apr., 1926	M. Lamoreaux, Ohio.....	Dec., 1923
G. F. Bowers, Onia.....	Apr., 1926	C. E. Davis, N. Y.....	Dec., 1923
W. Pocheul, Oregon.....	Mar., 1926	F. W. Copeland, Kansas.....	Dec., 1923
A. Garver, Ohio.....	Feb., 1926	J. L. Tomlin, Kansas.....	Dec., 1923
J. F. Murphy, Nev.....	Jan., 1926	H. A. Davis, N. Y.....	Dec., 1923
F. Kearnes, Illinois.....	Jan., 1926	E. H. Troyke, Illinois.....	Dec., 1923
J. N. McIntire, Pa.....	Jan., 1926	D. B. Johnson, Iowa.....	Dec., 1923
W. Post, N. Y.....	Jan., 1926	S. Horton, Calif.....	Nov., 1923
Powell Brothers & Whitaker, Eng- land.....	Jan., 1926	J. Spratt, Mass.....	Nov., 1923
O. Temple, Idaho.....	Jan., 1926	F. Watkins, N. H.....	Nov., 1923
N. Karolewicz, S. Dak.....	Jan., 1926	F. Koppins, Ala.....	Nov., 1923
M. L. Lain, N. Y.....	Dec., 1925	Y. C. Lienert, S. Australia.....	Oct., 1923
J. A. Hulvey, Illinois.....	Dec., 1925	W. B. Abell, N. Y.....	Oct., 1923
Williams & Turner, W. Va.....	Dec., 1925	W. R. Turner, Man.....	Oct., 1923
J. J. Devine, N. J.....	Dec., 1925	C. Nelson, Nebr.....	Sept., 1923
P. Nelson, Minn.....	Dec., 1925	H. M. Anderfuren, Calif.....	Aug., 1923
M. Kennedy, Tas. Australia.....	Dec., 1925	Camp Brothers, Texas.....	Aug., 1923
A. J. Wasmuth, Idaho.....	Nov., 1925	L. C. Larson, Iowa.....	July, 1923
J. G. H. Mallett, Queens, Australia.....	Nov., 1925	S. Effensar, South Africa.....	July, 1923
A. W. Spler, Ohio.....	Nov., 1925	G. L. DeWitt, Mont.....	July, 1923
W. R. Clepper, Texas.....	Nov., 1925	W. W. Gregg, Texas.....	July, 1923
G. H. Isley, Mass.....	Nov., 1925	W. R. Stroupe, N. C.....	July, 1923
Raynolds Brothers, Pa.....	Sept., 1925	O. C. Young, Michigan.....	June, 1923
F. W. Krenz, Calif.....	Aug., 1925	Otto Sippel, Pa.....	June, 1923
C. E. Allen, Nebr.....	Aug., 1925	A. Chapman, N. Y.....	June, 1923
A. E. Spangberg, Oregon.....	May, 1925	C. Birely, Md.....	June, 1923
D. M. Kille, Okla.....	Apr., 1925	F. H. Shupe, Pa.....	June, 1923
G. Oullgren, Iowa.....	Apr., 1925	J. C. Storer, Pa.....	Apr., 1923
G. Frevicks, Minn.....	Mar., 1925	W. Schoonover, Pa.....	Apr., 1923
V. Priesnitz, Wisc.....	Mar., 1925	J. M. Rumke, Iowa.....	May, 1923
E. Francis, Illinois.....	Feb., 1925	L. M. Rumsdale Brothers, Mo.....	Mar., 1923
D. C. Garber, Ohio.....	Feb., 1925	J. Carwell, Ark.....	Mar., 1923
J. H. Kurk, Illinois.....	Feb., 1925	G. E. Glasier, Ohio.....	Mar., 1923
M. R. Hiteshue, Ohio.....	Feb., 1925	G. Fath & Co., S. Africa.....	Mar., 1923
H. F. Schreiber, Pa.....	Feb., 1925	T. Bradley, N. S. Wales.....	Mar., 1923
J. S. Damm, Iowa.....	Jan., 1925	L. T. Needham, Illinois.....	Feb., 1923
J. M. Withers, Hawaii.....	Jan., 1925	G. C. Disinger, Miss.....	Feb., 1923
F. H. Jarvis, Indiana.....	Dec., 1924	J. Hughes, Ohio.....	Feb., 1923
George Tatum, Jr., Fla.....	Dec., 1924	J. Wieber, Minn.....	Jan., 1923
I. Clark, Va.....	Dec., 1924	Z. A. Enos, Minn.....	Jan., 1923
A. N. Estes, Va.....	Dec., 1924	W. G. Wise, Calif.....	Jan., 1923
J. Bailey, Manitoba.....	Dec., 1924	F. S. Bishop, South Africa.....	Jan., 1923
H. G. Naylor, Md.....	Dec., 1924	J. Curran, Arizona.....	Jan., 1923
Halvorson Brothers, S. D.....	Nov., 1924	S. P. Harney, Mont.....	Dec., 1922
P. Schicks, Washington.....	Nov., 1924	W. Breckner, Okla.....	Dec., 1922
H. E. Snyder, Oregon.....	Nov., 1924	J. Pabina, Nebr.....	Dec., 1922
J. A. Stewart, Ky.....	Oct., 1924	P. Frederickson, Iowa.....	Nov., 1922
C. Richenecker, N. Y.....	Oct., 1924	L. O. Lelurs, Illinois.....	Nov., 1922
W. L. Bertholf, N. J.....	Oct., 1924	W. Lawson, New Zealand.....	Nov., 1922
J. W. Hewson, S. Africa.....	Sept., 1924	W. O. Grant, Calif.....	Oct., 1922
Ed. Larson, N. D.....	Sept., 1924	A. H. Miller, Iowa.....	Oct., 1922
T. M. Monk, Illinois.....	Sept., 1924	A. O. Martin, Idaho.....	Sept., 1922
W. T. De Young, Illinois.....	Sept., 1924	O. A. Mortimer, Idaho.....	Sept., 1922
C. W. Taylor, Pa.....	Aug., 1924	H. J. Hyatt, Washington.....	Sept., 1922
Charles Wells, Colorado.....	Aug., 1924	J. N. Skow, Iowa.....	Sept., 1922
H. G. Weaver, Pa.....	Aug., 1924	A. D. Standiford, Washington.....	Sept., 1922
Working Men's College, Viet.....	June, 1924	T. Temkiewicz, Quebec.....	Sept., 1922
W. M. Kenoyer, Nebr.....	June, 1924	A. Peliffer, Ohio.....	Aug., 1922
E. C. Frederick, N. D.....	May, 1924	W. D. Valentine, Iowa.....	Aug., 1922
J. L. Fenton, New Mexico.....	May, 1924	G. Hoffman, N. Y.....	July, 1922
J. Carl, Iowa.....	May, 1924	J. Erman, Ark.....	July, 1922
J. E. Little, Pa.....	May, 1924	W. K. W. Hansen, Pa.....	June, 1922
		Robert Tochter, Calif.....	June, 1922
		J. Van Marter, N. Y.....	June, 1922

NAME	Subscription Paid to	NAME	Subscription Paid to
F. Norrie, Yukon Ty.....	Jan., 1922	L. Underhill, California.....	June, 1920
E. Anders & Son, S. Australia.....	May, 1922	F. Felts, Ohio.....	June, 1920
Louisa Carriage Works, Va.....	May, 1922	W. M. Puryear, Ala.....	June, 1920
S. Smith, Texas.....	Apr., 1922	W. L. Patterson, Okla.....	June, 1920
J. W. Haar, La.....	Mar., 1922	D. Hardy, Viet.....	June, 1920
D. W. Smith, La.....	Mar., 1922	E. Malpas, S. Australia.....	June, 1920
D. W. Smith, Rhode Island.....	Mar., 1922	A. J. Hamburg, Ohio.....	June, 1920
E. A. Dillon, Nev.....	Mar., 1922	C. M. Holton, Okla.....	June, 1920
D. F. Kuster, Washington.....	Mar., 1922	C. L. Graf, Ohio.....	June, 1920
G. F. Johnson, Michigan.....	Feb., 1922	A. Mellum, N. D.....	June, 1920
R. H. Keith, Iowa.....	Jan., 1922	J. A. Schmitz, N. D.....	May, 1920
F. H. Joellin, Mass.....	Dec., 1921	P. Wright, Calif.....	May, 1920
J. B. Scheidler, Indiana.....	Dec., 1921	F. Greer, Queens.....	Apr., 1920
J. H. Ickes, Pa.....	Dec., 1921	C. L. Morman, N. Y.....	Apr., 1920
E. Willis, Colorado.....	Dec., 1921	H. W. Fuhrkop, Ill.....	Apr., 1920
J. Delane, Nebr.....	Nov., 1921	A. Stephens, Queensland, Aust.....	Apr., 1920
O. M. Johnson, Miss.....	Oct., 1921	Alex. Zimmer, Ont.....	Apr., 1920
H. Feldus, Nebr.....	Sept., 1921	J. Weber, N. Y.....	Mar., 1920
A. S. Pratt, New York.....	July, 1921	Clark Bros., Cal.....	Mar., 1920
H. Baker, Aust.....	May, 1921	W. H. Leonard, Penn.....	Mar., 1920
F. E. Smith, Vermont.....	May, 1921	Ed. Grimm, Tex.....	Mar., 1920
A. J. Hatch, Maine.....	May, 1921	H. L. Place, S. Australia.....	Mar., 1920
W. Cornwall, Pa.....	May, 1921	J. Hiernens, Minn.....	Mar., 1920
W. F. Kline, Kansas.....	May, 1921	G. S. Akers, Va.....	Mar., 1920
W. Winget, Vt.....	Apr., 1921	F. White, N. Y.....	Feb., 1920
J. A. Johnston, N. D.....	Apr., 1921	J. H. Willey, Penna.....	Feb., 1920
A. H. Laird, N. Y.....	Apr., 1921	W. Nasgowitz, Wisc.....	Feb., 1920
A. J. Prue, N. Y.....	Apr., 1921	J. F. Lelas, N. J.....	Feb., 1920
C. A. Butler, Ohio.....	Apr., 1921	C. M. Jacobsen, Utah.....	Feb., 1920
E. Moosner, Queens, Australia.....	Apr., 1921	I. Blough, Penna.....	Feb., 1920
W. C. LeBow, Mo.....	Mar., 1921	Hope Bros., B. C.....	Feb., 1920
William Pate, Mo.....	Mar., 1921	D. Shearer, Ohio.....	Jan., 1920
A. T. Jameson, Colorado.....	Mar., 1921	J. B. Windle, Iowa.....	Jan., 1920
C. Alexander, N. Y.....	Mar., 1921	J. E. Erickson, Minn.....	Jan., 1920
J. Fencel, Wisc.....	Mar., 1921	A. Fisher, W. Va.....	Jan., 1920
H. Cornils, Oregon.....	Mar., 1921	I. J. Giguere, N. H.....	Jan., 1920
C. Schmid, Nebr.....	Mar., 1921	E. Gunther, Iowa.....	Jan., 1920
S. Schwarzmann, D. C.....	Mar., 1921	L. H. Willson, Vermont.....	Jan., 1920
S. Button, Kans.....	Feb., 1921	D. R. White, Kansas.....	Jan., 1920
N. F. Hartoso, Mo.....	Feb., 1921	P. Bianchi, Texas.....	Jan., 1920
I. Koepke, N. Y.....	Feb., 1921	R. S. Crisler, Ky.....	Jan., 1920
R. E. Worthington, N. Y.....	Feb., 1921	T. A. Mahar, Mo.....	Jan., 1920
B. E. Doughtett, Kansas.....	Feb., 1921	T. Horne, Ariz.....	Jan., 1920
J. Toose, Kansas.....	Feb., 1921	H. B. Draper, Ind.....	Jan., 1920
Shellhaas & Fry, Colorado.....	Feb., 1921	H. H. Schoob, Wyo.....	Jan., 1920
J. W. Wilson, Mo.....	Feb., 1921	L. A. Costa, Mont.....	Jan., 1920
W. T. Wilson, Indiana.....	Feb., 1921	H. Kraft, Calif.....	Dec., 1919
J. Schmid, Nebr.....	Feb., 1921	S. Barber, Iowa.....	Dec., 1919
E. Rlee, New York.....	Feb., 1921	M. Martin, S. D.....	Dec., 1919
A. B. Skerritt, New York.....	Feb., 1921	R. I. Ryberg, Iowa.....	Dec., 1919
W. C. Abbott, Ohio.....	Jan., 1921	Day & Sons, Viet.....	Dec., 1919
Neufeld & Giesbrecht, Kans.....	Jan., 1921	E. M. Crouch, Conn.....	Dec., 1919
Feldmeyer & Schaeke, Mo.....	Jan., 1921	R. Werk, Nebr.....	Dec., 1919
A. Josepelt, Colorado.....	Jan., 1921	J. R. Wilson, Md.....	Dec., 1919
C. L. McNall, Mo.....	Jan., 1921	N. Buchanan, Ont.....	Dec., 1919
A. Turley, Kansas.....	Jan., 1921	P. Refk, Ohio.....	Dec., 1919
A. Seidel, Nebr.....	Jan., 1921	A. Larsen, Ida.....	Dec., 1919
W. Ruple, Pa.....	Jan., 1921	H. Andersen, Iowa.....	Dec., 1919
N. A. Englund, Iowa.....	Jan., 1921	I. F. Powers, N. J.....	Dec., 1919
O. Gerhardestin, Ohio.....	Jan., 1921	J. G. Grandlund, Conn.....	Dec., 1919
W. C. Rutter, Illinois.....	Jan., 1921	J. B. Horn, N. Mexico.....	Dec., 1919
J. L. Jester, Mo.....	Jan., 1921	J. Mason, Ill.....	Nov., 1919
G. A. Moffatt, Yukon Ty.....	Jan., 1921	C. S. Kiang, Pa.....	Nov., 1919
J. W. Irie, Utah.....	Dec., 1920	C. H. Sandstone, N. Y.....	Sept., 1919
O. A. Huff, Pa.....	Dec., 1920	L. Pates, Minn.....	Sept., 1919
J. T. Rowe, Iowa.....	Dec., 1920	I. Moyer, Pa.....	Aug., 1919
W. Parsons, Ontario.....	Dec., 1920	J. Owen, Ohio.....	Aug., 1919
Eisler Brothers, S. Dak.....	Dec., 1920	W. Coung, Penn.....	Aug., 1919
J. Krahulec, Illinois.....	Dec., 1920	C. Schnake, Ind.....	Aug., 1919
L. F. Keilhois, Pa.....	Dec., 1920	W. Murray, Calif.....	July, 1919
F. Markgraf, Minn.....	Dec., 1920	H. S. Tothers, Pa.....	July, 1919
S. Wright, New York.....	Dec., 1920	R. Mrazek, Texas.....	July, 1919
T. P. Consodine, Mass.....	Dec., 1920	C. Chaunette, N. H.....	July, 1919
J. D. Fox, Nebr.....	Dec., 1920	S. Chaupette, N. Y.....	July, 1919
W. Treener, Washington.....	Dec., 1920	H. Stadler, Calif.....	July, 1919
A. G. Palmquist, Minn.....	Dec., 1920	J. Fingar, N. Y.....	July, 1919
J. E. Richards, Pa.....	Dec., 1920	A. Moehler, N. Y.....	July, 1919
D. Codere, Illinois.....	Nov., 1920	G. W. Tellman, Tenn.....	July, 1919
C. Franssen, New York.....	Nov., 1920	J. Nicholaisen, Conn.....	July, 1919
J. Delane, Nebr.....	Nov., 1920	J. R. Beck, Mass.....	July, 1919
J. H. Staates, Mo.....	Nov., 1920	S. Rinkenberger, Ill.....	July, 1919
George F. Wardle, S. D.....	Nov., 1920	H. M. Houck, Ill.....	July, 1919
H. C. Strine, Pa.....	Nov., 1920	H. Eberhart, Ohio.....	June, 1919
C. M. McNutt, Mass.....	Nov., 1920	A. C. Barr, Wisc.....	June, 1919
H. M. Mapes, New York.....	Nov., 1920	H. B. Schoonover, N. Y.....	June, 1919
W. Condon, New York.....	Nov., 1920	P. F. Schultz, N. Y.....	June, 1919
F. Strief, Wisc.....	Nov., 1920	T. Colrow, N. Y.....	June, 1919
L. P. Mortensen, Michigan.....	Nov., 1920	P. Guyett, N. Y.....	June, 1919
A. W. Brennenman, Indiana.....	Nov., 1920	F. Schaaf, Ill.....	June, 1919
McFarlane & Pratt, S. Africa.....	Oct., 1920	R. Koepf, Minn.....	June, 1919
Thomas Scurr, New Zealand.....	Oct., 1920	H. Miller, Calif.....	June, 1919
W. H. Finlay, New Zealand.....	Oct., 1920	W. O. Goundry, N. Y.....	June, 1919
J. Jordan, Cal.....	Sept., 1920	F. R. Briggs, N. Y.....	June, 1919
J. Jordan, Calif.....	Sept., 1920	T. M. McGee, Tenn.....	June, 1919
L. O. Breke, Washington.....	Sept., 1920	R. Anderson, N. Y.....	June, 1919
R. D. Stinkins, Penna.....	Sept., 1920	J. H. Phillips, Mass.....	June, 1919
L. R. Garvin, Ohio.....	Sept., 1920	French & Reber, Kansas.....	May, 1919
A. E. Reeve, Mass.....	Sept., 1920	Ball & Burkett, Kansas.....	May, 1919
L. E. Bonton.....	Aug., 1921	F. W. Biberstein, Kansas.....	May, 1919
G. W. Phillips, Utah.....	Aug., 1920	F. Wels, Kansas.....	May, 1919
T. Chittenden, New Zealand.....	July, 1920	W. Barker, Kansas.....	May, 1919
O. Smith, Pa.....	July, 1920	D. Davis, Kansas.....	May, 1919
F. A. Poole, South Africa.....	July, 1920	T. Quinlan, Kansas.....	May, 1919
C. Gibson, Ill.....	July, 1920	A. Sconover, Kansas.....	May, 1919
H. M. Whitman, Neb.....	July, 1920	F. Girard, Iowa.....	May, 1919
The Goldfield Diamond Drilling Co., Victoria, Australia.....	July, 1920	T. Martin, Iowa.....	May, 1919
G. M. Robben, Kans.....	July, 1920	G. Ouderkrirk, Iowa.....	May, 1919
R. J. Rees, S. Australia.....	July, 1920	E. Clark, Mo.....	May, 1919
A. C. Morrell, N. B.....	June, 1920	A. Furnier, N. Y.....	May, 1919
		H. J. Ruprecht, N. Y.....	May, 1919
		T. L. Cappucci, N. Y.....	May, 1919
		L. W. Voorhees, N. Y.....	May, 1919



Making and Repairing Well-Drilling Jars

J. R. SWARTZ

In making jars from the solid the object to be attained is to turn out a job with the fewest welds possible.

The stock used should be about 1-3 the diameter of jars in thickness and nearly the whole diameter in width, of mild steel or the best iron obtainable. The length of bar required depends upon the length of stroke and length of jars. That is, a 4-inch stroke and 10-inch jar heads will require 14 inches of an opening in links from head to crotch, to this must be added the necessary stock to weld to joint so that about 28 inches of bar is needed for each link.

First draw out the tongue to about three inches in length, the width of tongue should be less than the diameter of jars and it should have a little taper each way. These tongues are not only for the purpose of letting the jars work smoothly in the hole, but also the one on lower link is there for the purpose of affording a hold for the jar tongue socket in case both reins of upper link break off at the head.

The next step is to split the bar down the center to form the reins. Now spread reins apart so as to allow you to weld in a hard steel slug to form the striking head. Having driven in the slug tight with the fork, shown at C, in the engraving, Fig. 1, which answers both as a shaper and porter bar and close down weld between swages under hammer. You will notice that the slug has a slightly rounded head and has small lips where it is welded to reins. This is to prevent forming a shut in welding. A block will be needed to finish shaping the reins at the crotch.

When both links are forged they may be heated and put together and the reins straightened and welded together at the crotch. The scarfs are then drawn out and welded to box and pin with cleft welds. In closing up these welds the hammer should begin right over the tongue of weld and work toward the lips of the scarf. Otherwise, the lips catching first and the metal stretching under the hammer is apt to leave the tongue loose in the cleft.

The block shown in Fig. 3 should be used when welding the crotch of links before scarfing, or they may close in enough to pinch the jar tongue.

After welding to box and pin and straightening jars to line upright

the links should be heated and left to cool slowly to eliminate strains.

Making jars in sections is done by forging out head with scarfs like the one used at head in repair. The main part of reins is forged same as the one shown for repair, but the ends at crotch are shaped and welded and scarfed the same as those parts are when making them from the solid.

Top and bottom fullers may be of use in fluting the heads on sides where the reins of the other link

sound one and welded to the head, the flute in jar head smoothed up and the links put together and welded to the box and pin.

In closing down these welds it is best to use a block as shown to keep the crotch from closing in, which would cause the jars to lock if not break the welds when the jars were put to use. The idea of making the weld at head as shown is to give a full bearing on the striking heads, and if the new rein should be of softer stock than the head the tongue

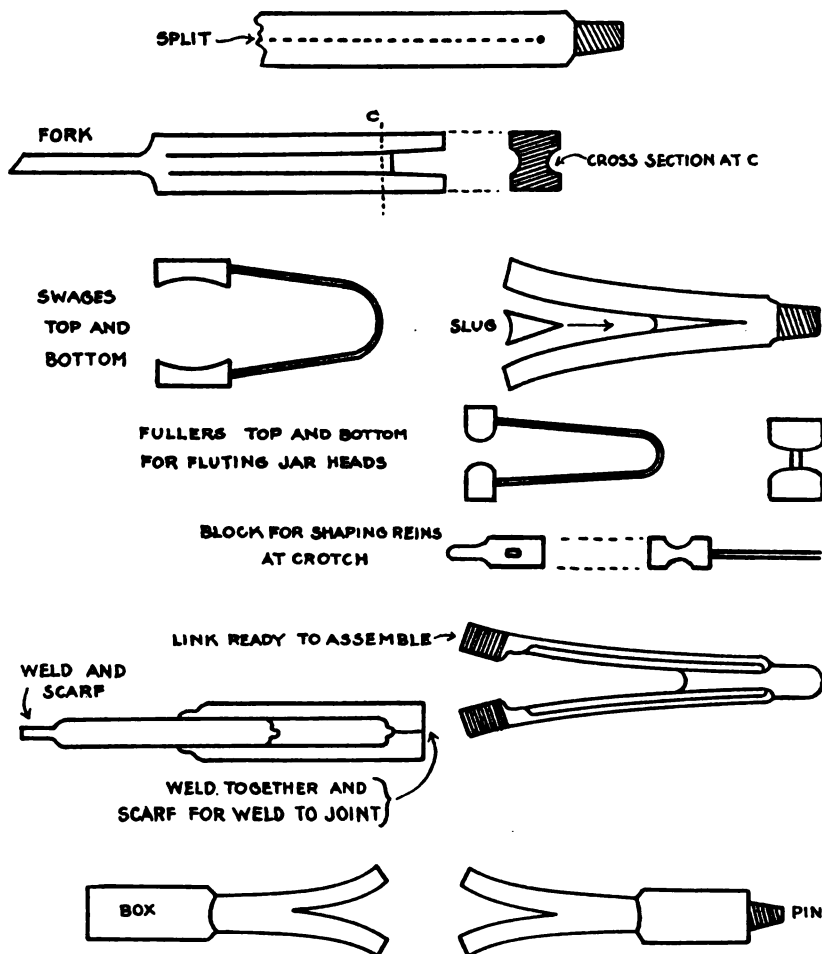


FIG. 1—MAKING THE JARS FROM THE SOLID STOCK

pass. The engraving at Fig. 2 shows how jars are built in sections.

I have received a request to forward a plan to repair a pair of jars broken as shown in A, in Fig. 3.

Both links will have to be cut loose from the box and pin, heated and the reins spread so that the links may be taken apart. The manner of cutting is shown at B.

Then cut off the broken rein a little below the striking head and scarf for a cleft and tongue weld, being careful to leave the striking head full. This scarf may be made with a set or by chipping. A new rein is then forged to match the

of harder metal will tend to prevent excessive side wear on the link.

After the jars have been welded up, the reins of both links should be heated to a red heat to relieve the strains of welding and left to cool off gradually. The stock used in making this repair should be mild steel or the best iron to be had. In smoothing flute in jar head after welding in new rein, it would be better to chip away the surplus metal than to fuller it out as fullering might strain the weld and cause it to break.

The jars commonly used on rod and rope rigs in Franklin Co., Pa.,



and known as Franklin Jars, are a modification of the old style square linked jars, and give fairly good service. The reins are forged over a flat bar or block and require but few tools to make.

An inquirer wishes to know how to work the flute in the blades of drilling bits. This may be done with top and bottom fullers or dies of the same shape may be fitted to the steam hammer and the job done in

that way. Care should be taken to have the corners at ends of fullers rounded so as not to form cuts or shuts in the metal when forging drilling tools.

One can buy billets fluted and scarfed ready for welding into pins or bit shanks. Bits are always welded with cleft welds and the welding should begin next to pin and work toward the blade of bit. Joints are welded to stems in the same way the

stubs of joint being cleft. However, where one has not the proper facilities for welding on joints in the usual manner a very good job may be done by drawing down both parts to the same diameter. Square the end of one piece and slightly round the end of the other as shown, then punch a $\frac{1}{2}$ -inch hole in the center of each piece to be joined a little over an inch reep, put both sections into fire and when near the welding heat, slip a pin, two inches long, into the hole of one section and put back into fire and push pin into hole in other piece. This pin will keep the parts in place and the weld may be driven solid in the fire. The bulge at weld may then be smoothed and job lined up with stem.

This weld begins at the center and closes toward the edge, making a solid job. Light stems may be driven together with a sledge, while heavier ones may require a ram. I have seen it work with sledge on $3\frac{1}{2}$ -inch auger stems and make a good job.

Common Mower Troubles and the Remedies

C. O. REED AND A. TORNQVIST IN FARM IMPLEMENT NEWS.

In discussing machine troubles it is necessary to mention all of the causes for any particular trouble. Some of these causes and the remedies will seem very simple and useless to mention, but a wide experience in the field has taught that the simplest causes are those which are often overlooked by some farmers and experts.

Heavy Draft

Heavy draft in the mower is caused by (a) poor lubrication; (b) a dull sickle, or (c) non-alignment. The remedies for causes (a) and (b) will be obvious to the farmer, but the smith may be called upon to remedy cause (c) which is often overlooked and not readily understood. The sickle and pitman should work in a straight line with one another as shown at 3 in Fig 1. If the outer end of the cutter bar has dropped back as shown at 1 in Fig 1, some of the power is consumed by the increased friction on the inside shoe parts. This increased friction causes increased draft, but it does not cause side draft as is often supposed.

The fact that non-alignment does not often occur in mowers of less than three or four seasons' usage, except in machines subjected to unusual strains, tends to prove that non-alignment is usually caused by wear in the hinge joints between the cutter bar and mower frame.

Many mowers now carry special aligning adjustments by which the outer end of the cutter bar can be brought ahead into line with the pitman. Such adjustments are so placed that they change the position of either the inside shoe in respect to the yoke or the yoke in respect to the push and drag bars. Such adjustments are successful aligning adjustments, for they change the angle between the cutter bar and pitman at its apex, namely, in the hinge joints. Adjustments which

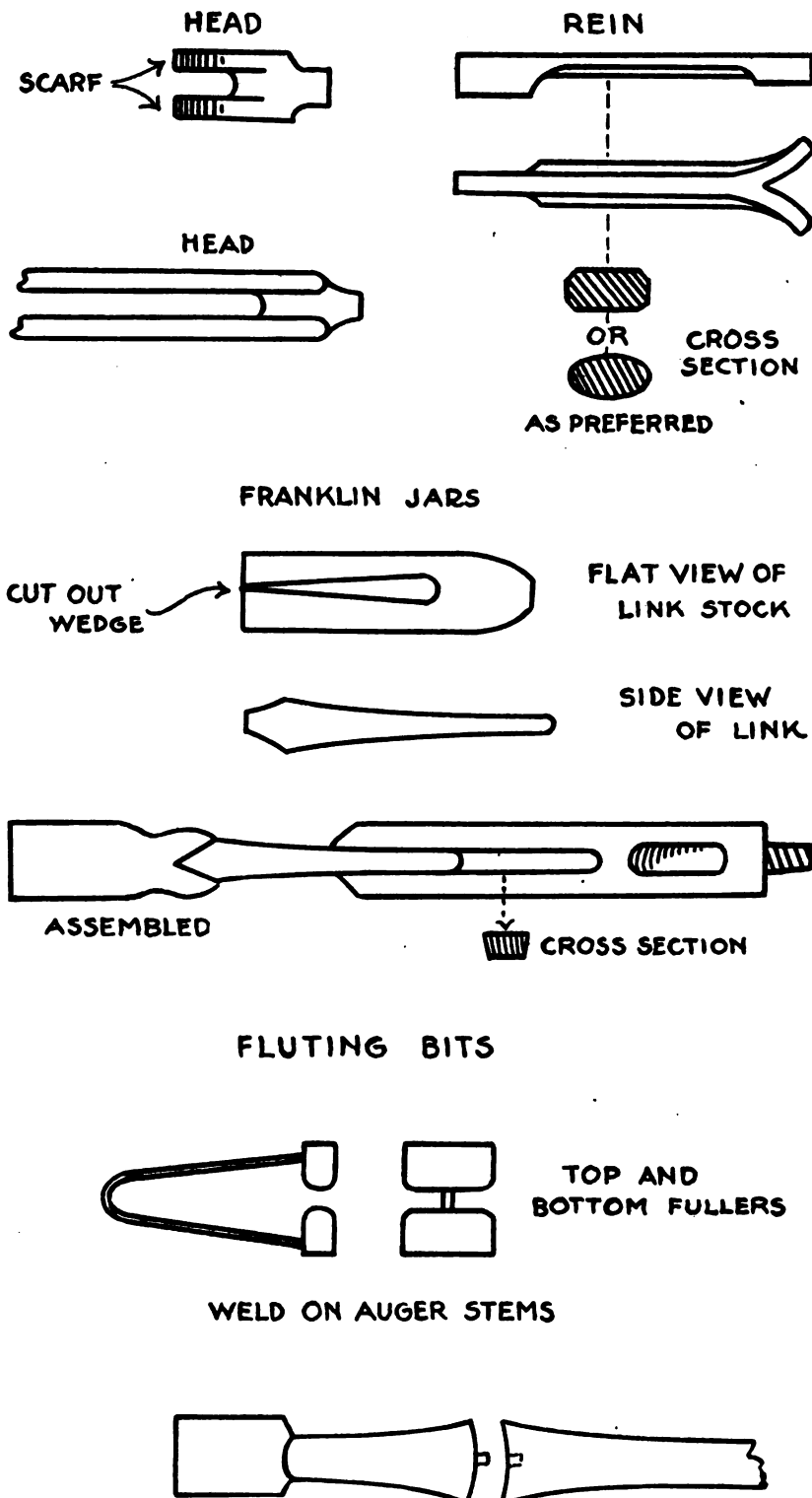


FIG. 2—HOW THE JARS ARE MADE WHEN BUILT UP



do not change this angle at its apex are not successful aligning arrangements and should not be resorted to. The cutter bar shown at 1 in Fig. 1 cannot be properly aligned by screwing the socket further onto the drag bar, nor can it be aligned by lengthening the push bar alone. If the push bar can be lengthened and the drag bar shortened at the same time, aligning can be accomplished to some extent; but the common notion that the adjustment of one of these bars will accomplish aligning is not only erroneous, but the practice of shortening the drag bar is also a dangerous one inasmuch as it effects "centering" as will be discussed later.

Mowers which do not carry a special aligning adjustment can often be aligned sufficiently by replacing the worn parts with new ones. New inside shoe pins alone will sometimes remedy the trouble.

ness to make the pin fit snugly. Seats should be filed into the yoke so that the bushing can be properly seated to keep its place. This may seem a delicate and laborious process but it is in fact quite simple if a little care is exercised. It is the only successful method to pursue in some instances and is entirely practical to prevent a mower being returned as unsatisfactory.

The cutter bars in most new machines are set a little ahead; this is good practice in the long run and should not be objected to by the purchaser.

The dealer should also keep in mind the fact that in many mowers the alignment is materially affected by the tilt of the cutter bar. Some farmers will suddenly discover non-alignment and begin to complain. A little questioning will reveal the fact that the operator has been compelled to tilt down, and a word of explanation

but the moment the stalks are permitted to force the sickle away from the ledger plates the grass begins to wedge between the cutting surfaces where it is chewed and crushed off, or held until pulled off as the cutter bar moves to the front. This failure to clean not only causes extra draft, but it is the primary cause for side draft, because the stalks drag back on the cutter bar, producing resistance on one side of the tongue the same as we produce it by pulling on the grass stick. Side draft cannot help but result from such a condition of the cutter bar and the remedy for the trouble usually lies wholly in reach of the farmer himself if the dealer will but explain the principle and repair, and supply such new parts as may be necessary to replace badly worn clips, wearing plates and ledger plates.

It is interesting to note here that a properly adjusted eight-foot mower is considered to work with as little side draft as a five-foot cut. This tends to show that the usual objection of side draft in the wide cuts is founded upon experience with poorly adjusted cutter bars for if the operator allows side draft to exist of course it will become more noticeable in the wide cut machines.

The causes for uneven stubble and side draft are: (a) guard or guards being out of alignment, (b) badly worn clips, (c) loose sickle sections or guards, or (d) sickle not centering.

Cause (a) is very common. The manufacturer is extremely careful to have the ledger plates in line when the mower leaves the factory, for he considers that this is one very essential point in good mower construction. The machine is not used ten days, however, before one or more guards have been bent up or down. If a guard is bent down, its ledger plate is carried away from the sickle and the shearing ability of the two parts greatly impaired. If a guard is bent up, it forces the sickle off the ledger plates of the adjacent guards and a still worse condition exists. Sight along the bottom of the guards at a point about an inch from the tips, then with a hammer drive back into line any guard which is found bent up or down. The guards are malleable and should be hit on the under or upper side about an inch and a half from the point. To be sure, this is not a very delicate means of aligning guards but it is all that is practical to do to a part that will be so abused by the average operator. If this method results in a broken guard, the expert should not feel particularly chagrined for a broken guard that can be replaced is better by far than a badly bent guard.

If the clips shown in Fig 2 wear sufficiently to allow the sickle to rise from the ledger plates, trouble (b) is in evidence and can be remedied by bending the clips down slightly by tapping with a hammer. If this method is used, great care must be exercised not to cause binding. Place one hand on the sickle head and then after each hammer blow move the sickle to see that binding has not resulted. If a clip has been bent down too far it can be brought back by forcing a cold chisel between it and a sickle section. If the owner will stand for the use of new parts, the surest method for clip repair is to place new clips, but when the helper's time is considered this may not be the most profitable method. If the sickle sections have become grooved by the clips, it may be necessary to bend down new clips after same are placed. Of course, the method

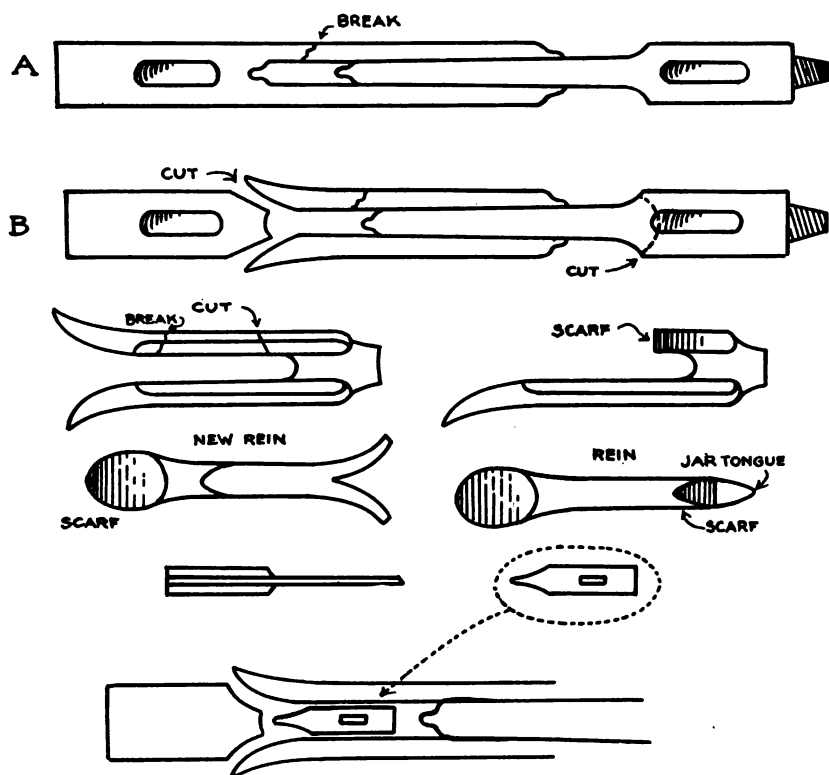


FIG. 3—SHOWING HOW TO REPAIR JARS THAT HAVE BEEN BROKEN

If this method fails and if it seems impractical to advise the purchase of a new yoke or new inside shoe, then the problem of aligning becomes more difficult, but if necessary it can be accomplished by bushing either the front or rear pin hole in the yoke. This method should be attempted only by the good mechanic. To illustrate the process, let us suppose that we are to align the cutter bar at 1 in Fig. 1 by bushing the rear pin hole in the yoke. Remove the rear pin only and carry the outer end of the cutter bar ahead until it is in line with the pitman as tested by a string stretched across the two as shown at 3 in Fig. 1. Sighting through the rear pin hole will now show that the shoe hole is a little out of line with the yoke hole. With a round file, file the yoke hole until the pin can be placed snugly through the two holes without drawing the cutter bar back out of alignment. Then bush up the yoke hole opposite the place where filed with carefully fitted sheet iron of the proper thick-

ness will usually satisfy the purchaser that this is a little trick that most mowers have and that it should not be considered serious. Mowers which carry special aligning adjustments can be quickly lined at different tilts.

Uneven Stubble and Side Draft

These troubles are by far the most common and are due to poorly adjusted cutter bar parts. A properly adjusted cutter bar is one of the most delicate and yet one of the most abused parts in agricultural machinery. In discussing these troubles let us remember that the principle of the cutter bar is the same as that of a pair of shears. If the blades of shears are held close together, a clean cut can very easily be made; but loose shears will permit the material to be cut to wedge between the blades where it is crushed or chewed off, thus causing binding. So it is with mower cutter bar parts; if the sickle sections are held down into very close proximity with the ledger plates of the guards (shown in Fig. 2) the stalks can be very easily cut,

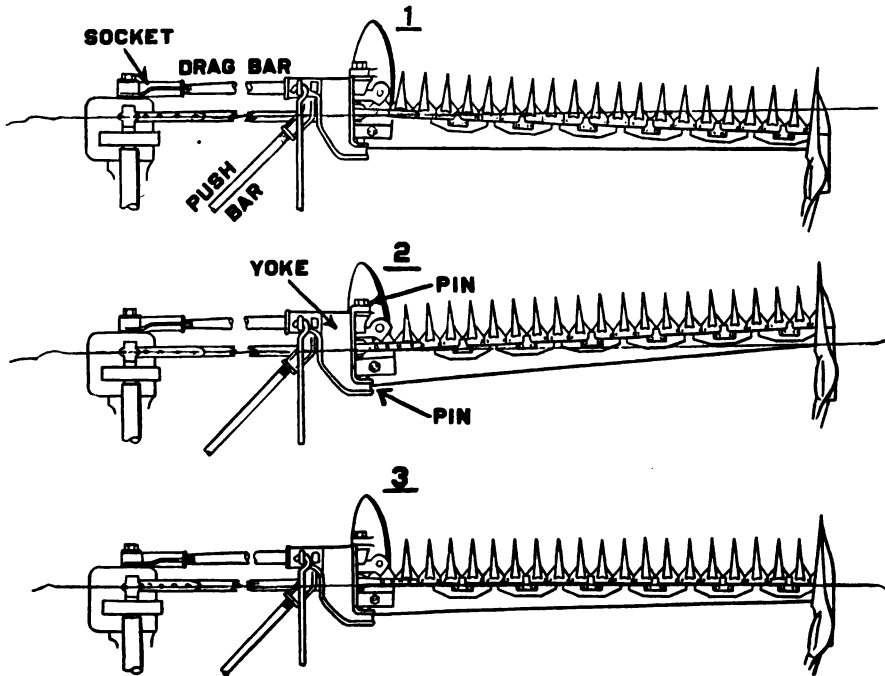


FIG. 1—ALIGNING THE CUTTER BAR OF THE MOWING MACHINE

of bending down clips cannot be used on cutter bars in which both old and new sickles are used. On such cutter bars the only safe procedure is to supply new clips and these clips must remain adjusted for the newest sickle. Emphasis should again be placed on the necessity of care to prevent binding. The extra draft due to sickle binding may very easily become more objectionable than side draft.

Cause (c), or uneven stubble and side draft resulting from a loose sickle or guard, can be detected easily by long and rugged stubble left at any particular point along the bar, or by the usual rattle of the loose parts. The remedy is obvious.

Cause (d), or sickle not centering, is a cause for uneven stubble which is often misunderstood and overlooked. At the termination of the sickle's "out" and "in" stroke, the points of the sickle sections should come to rest in the center of the guards as shown at 1 in Fig. 2. Such a sickle is said to "register" or "center" correctly. At the termination of the "in" stroke if the sickle comes to rest as at 2 in Fig. 2, the sickle is "off center" and the grass at H will remain uncut until the sickle has again begun its "in" stroke. It can readily be seen that such a condition will cause uneven stubble, though this trouble alone will not necessarily cause side draft with old sickle bars.

There are two common causes for non-registering. Attempts to align the cutter bar by lengthening or shortening the drag bar will throw the sickle off of center. Conversely, if the sickle is off center it can be centered by the drag bar adjustment. Hence the sickle shown at 2 in Fig. 2 can be made to register by lengthening the drag bar which will force the cutter bar to the right irrespective of the sickle and pitman. Thus the danger of attempting to align the mower by the drag bar socket, as discussed under heavy draft, becomes evident, and it should be remembered that such adjustment is to be used to effect centering only.

The second common cause for non-registering is the use of a pitman which is too long or too short. It often happens that

the farmer will buy a new pitman stick only, with the idea that it is a simple matter to rivet on the pitman socket and pitman head. What he really does in most cases is to miss measurements by some fraction of an inch and when the job is completed his sickle is off center. Farmers should be advised to purchase the whole pitman new, or warned to use great care in getting the rivet holes in the right place to give the proper length to the pitman. If the riveting is done at the shop the expert should not attempt the task unless all of the broken parts of the old pitman are at hand from which he may secure the proper dimensions to be maintained. On the old types of mowers which carry iron pitmans, centering of the sickle can be very quickly accomplished by screwing the pitman in or out of the socket or pitman head. It is obvious that care must be taken to maintain the proper length when an iron pitman is welded.

The practice of replacing nicked ledger plates and sickle sections with new ones is to be recommended, but unless the smith is paid well for his time it is hardly profitable and practical for him to replace a whole set of ledger plates which have become worn on the cutting edge. Ledger plates will remain in good condition for a considerable length of time if the guards are kept in line and the sickle is forced to work close to the ledger plates where it belongs. If new ledger plates are placed under a poorly adjusted sickle they will be short lived, hence why not strike with all effort directly at the root of the trouble rather than simply to supply parts which instead of being the cause of for the difficulty are only destroyed as the result of the trouble. Old ledger plates in properly aligned guards under a sharp and properly adjusted sickle will usually give greater satisfaction in the long run than new plates under a poorly adjusted knife.

Broken Knives

This troublesome and deceiving difficulty is caused by badly worn clips and wearing plates in the inside shoe. As the pitman forces the sickle out there is pressure downward on the sickle head. As

the pitman draws the sickle in there is a pull upward on the head. These forces cause considerable wear on the clips and on the wearing plates in the inside shoe. When these parts have become sufficiently worn to permit play, the sickle head is flopped up and down, and this slight but continual bending of the sickle rib at the end of the sickle head reinforcement results in a break across the outside rivet hole just as one can sever a wire by continually bending it at one point. The remedy is to supply new wearing plates and clips on the inside shoe. In extreme cases it may be found necessary to supply a new sickle head also. Just why sickle breaking is more frequent in light cutting than in heavy work is a widely disputed question, but it seems evident that light cutting increases the flopping of the head and aggravates the trouble by virtue of the fact that a team generally walks faster in light cutting than in heavy work.

It is often claimed that non-alignment causes sickle breaking. This may be true to a certain extent but non-alignment of the sickle is more of an indirect than a direct cause for the first thing that non-alignment will do is to cause excessive wear on the inside shoe parts.

A badly worn pitman box at the crank wheel and a beaten crank shaft bushing behind the crank wheel will increase the danger of broken sickles. Objectionable wear in these parts can be detected by the familiar rattle when the mower is at work or by a looseness that can be found by hand testing. The remedy is obvious, and inasmuch as wear in these parts will permit objectionable lost motion at all times, before greater trouble results.

It is well to supply a new pitman box

Other Troubles

Undue Wear on Outside Clips and on Center Wearing Plates.—This is caused by cutter bar humping or arching in the center due to lifting spring being too tight.

Cutter Bar Clogging at One Point.—This results from a loose or broken sickle section or a loose guard.

Cutter Bar Parts Badly Gummed Up.—This trouble is common in some conditions

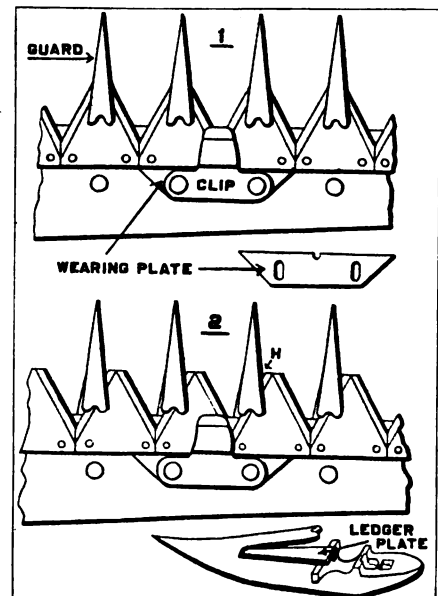
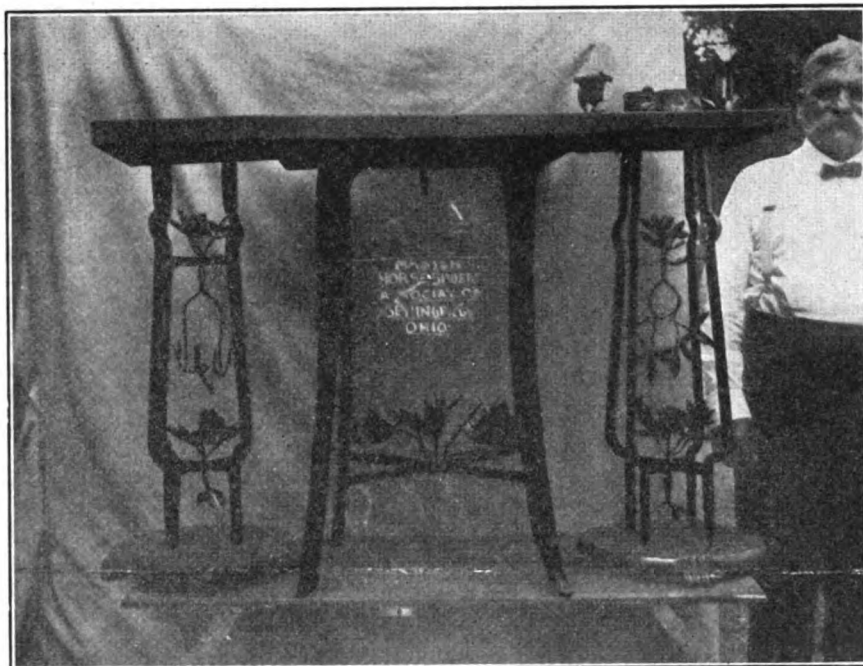


FIG. 2—SICKLE REGISTERING PROPERLY AND IMPROPERLY



THE TABLES MADE BY AUG. J. REICH FOR USE IN THE ASSOCIATION ROOMS

of clovers and is caused by using oil on knife parts where there is considerable grass juice. Grass juice and oil make a heavy gum which will increase draft. Do not advise the use of oil on those knife parts which are kept moist by the juices. It is better practice to run the sickle "dry", but care must be taken at all times to keep the sickle head well oiled.

Grass Board Bunching—This is a trouble found in heavy clovers and will sometimes cause the cutter bar to clog. Lower the grass stick.

Grass Board Failing to Throw—This is an aggravating trouble often encountered in short or slippery grass, and hard to remedy if encountered in very heavy green stuff. No general rules can be given, but relief can often be had, however, by raising the grass stick on the grass board. This will cause the grass to bunch and be rolled back out of the way in bunches. A better path is left clear by such procedure, but if bunching is a hindrance to curing, we may have to refrain from such adjustment.

Aligning the Sickle-Bar—See under (c), "Heavy Draft."

Centering or Registering the Sickle—See under (d) of "Uneven Stubble."

Side Draft—See under "Uneven Stubble."

Tables for Association Rooms

AUG. J. REICH

The accompanying engraving show some of my work, although the pictures do not give very distinct ideas. The table, which will be used by the president of our local which was recently organized, is entirely of iron. The roses are made of old tire-bolts, also the sheaves, and the wreath is made of old tires. I believe it is the only one in the world. There are also two smoking stands and vases.

We have about thirty-two members in our association. The meetings, which are held every Thursday evening, are very interesting and lively.

Dog Diseases and Their Treatment

PROF. C. H. MESLER

There is no special medicine which can be given to successfully check the course of distemper, the treatment should be directed toward making the animal as comfortable as possible and so nourished to provide it with sufficient strength to resist the trouble. Dogs who are vigorous and active will usually recover, but weak, debilitated animals are likely to be overcome by the disease in the early stage of distemper. Half ounce doses of castor oil with two to three grains of boric acid added may be given every six hours until the bowels move freely. Two grains doses of quinine given twice may be used to advantage. The affected parts, such as the nose, mouth and eyes should be well washed out with warm water three times daily and the nose, and eyes greased with vaseline. The animal should be liberally fed on minced fresh beef, beef tea, sweet milk, raw eggs and grits and given all the cold water he will drink. Dried blood in doses of one-half to one teaspoonful three times a day is an excellent thing to use in the treatment of the disease.

Much of the sickness occurring among dogs is due to ignorance as to cleanliness and the improper method

of feeding. One of the most important things to be considered is care in feeding.

If the lungs are affected, apply a mustard plaster and give the following medicine, a teaspoonful every two hours.

Tincture Aconite Root—30 drops.

Sweet Spirit of Nitre— $\frac{1}{2}$ ounce.

Tincture of Gentian— $\frac{1}{2}$ ounce.

Syrup Tolu—2 ounces.

Water—4 ounces. Mix.

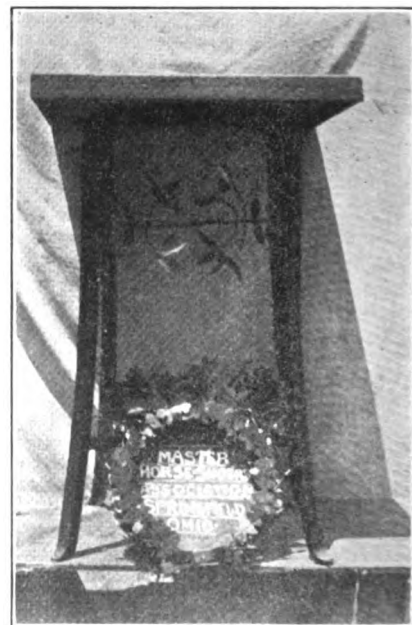
The Smith in The Daily News

Odd Mention of Anvil Ringers and Knights of the Forge in the News of the Day.

J. J. Bernet From Blacksmith to Railroad President.

From the blacksmith shop to the head of the Nickel Plate railroad is the route traveled by the new President, J. J. Bernet, who is 48 years old. His career points out the possibilities to those who really try and possess the determination to win out. Mr. Bernet worked five years at the anvil and during his spare time learned telegraphy. He entered the employ of the Lake Shore railroad as an operator and his progress has been steady and sure.

When Mr. Bernet went to work as a boy of 15 he ran errands until he decided to learn the trade of a blacksmith at Farnham, N. Y., near his birthplace. While learning his trade the lure of the railroad gripped him and he studied telegraphy. When he had mastered it sufficiently to be able to send and receive accurately he entered the service of the Lake Shore and



THE ORNAMENTAL TABLE MADE BY MR. REICH



Michigan Southern. His rise after that was meteoric.

A Blacksmith Should Be Careful Whom he Hits.

A fist fight following a quarrel, ended fatally today when John Carter, a blacksmith, struck Frank McNulty so hard that death resulted from a hemorrhage of the brain. Carter, who is charged with murder, has made a written confession, the police say.

Horse Missing—Blacksmith Laughs.

Returning to his home, Abraham Platsky found that his horse was missing from the barn. Neighbors informed him that a colored man had taken the horse from the stable. They were all sure, so they said, that it was a man of color.

Platsky leaped into a jitney bus and rushed to Police headquarters. He was greatly wrought up over the matter. Detectives got into the automobile and drove through the surrounding country for miles but without success.

On the return trip they were passing Frederick Schempp's blacksmith shop and there was the horse being shod. Schempp had promised to shoe the horse and said he went and got it. When informed of the stories told by the neighbors, Schempp enjoyed the joke and declared that he would go and get shaved at once.

Ship's Blacksmith Burned.

While assisting Coxswain V. D. Burnell of the U. S. cruiser, Boston, in firing a salute with a six-pound cannon, Ship's Blacksmith Frank Tullinger was painfully burned while Burnell was killed. The gun had fired eight shots of a salute when the ninth shot backfired, the shell bursting and fragments lodging in the breast of Burnell while the powder burned Tullinger.

Blacksmith Laid Foundation of Firearms Industry in America.

One hundred years ago, a boy of seven-teen was working with his father in a little blacksmith shop on the family estate. In the boy's mind had only been growing a yearning for a rifle—the hills about his father's farm were alive with game. On this memorable morning in 1816 the youth plucked up courage to ask his father for money to buy the coveted arm.

All hail the courage of American boyhood—and the traditional conservatism of American fathers!

For the boy's request was refused and right there was laid the foundation of Remington arms!

The boy was Eliphalet Remington, Jr.

It is familiar history in the valley—told and retold from father to son by many a fireside—how young Remington picked up scrap iron here and there, how by infinite labor he hammered it into a billet on the smithy anvil, how he carried the bar fifteen miles to Utica to have it bored and rifled, and how he finally assembled the complete rifle. It was a well made rifle and there was a demand for more—first among neighbors, then the people of the adjoining counties looked to Ilion for their hunting weapons. Day by day the Remington fame spread until the state and the nation, and finally the whole wide world found the path to the always growing factories for which this farmer-smithy boy genius laid the foundation. Today more than 25,000 workers are making fire-

arms and ammunition which go forth under the Remington name.

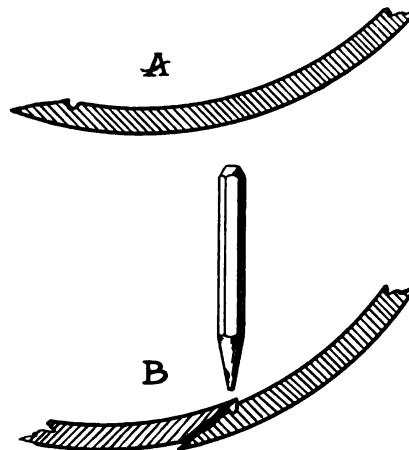
Bud Childs, Racing Shoer, Dead.

Bud Childs, colored, fifty-six years old, dropped dead at Churchill Downs, Kentucky, of heart trouble.

Bud had been a horseshoer at the Downs for many years. He was famous among turfmen for the skill with which he could attach the racing plates to the delicate hoofs of the thoroughbreds and he had shod some of the greatest horses that ever raced at the Downs. Many Derby winners came under the wire on shoes that had been adjusted by Bud's skillful hand.

Blacksmith Dies Repairing Auto.

Martin Ericson, a blacksmith of Wabash, South Dakota, went out before



MR. BOWLEY TELLS HOW HE WELDS TIRES

breakfast to repair an automobile that had been left at his shop to be fixed up. Not responding to the breakfast call, a member of the family went after him, and found Ericson lying dead beneath the automobile.

He had taken one wheel off the machine, placing a wheelbarrow under the axle as a prop. In some way the wheelbarrow was pushed away and the machine fell on him, the end of the steel axle striking Ericson on the breast directly over the heart, causing instant death. He leaves a wife and eight children.

Blacksmith Inherits Fortune

R. W. Younggreen, a blacksmith at Thurman, Kansas, a little trading point, has inherited 100,000 marks from an aunt, who recently died in Germany, according to word he has just received from New York city. The inheritance is equivalent to about \$25,000. It is said a trip to Germany to close up the estate by Mr. Younggreen, which would now be an impossibility, is not necessary and that the money will be sent to him.

Mr. Younggreen is a blacksmith by trade and for many years had a small shop in Emporia. Several years ago he moved to Thurman, twenty-five miles from the nearest railroad. Since going there he has been engaged in the blacksmith business besides running a small general store, acting as postmaster and running a farm.



Queries—Answers—Notes

Missouri. Prices.—I have a 10-horse power Regan gas engine and a 20-inch corn burr. In connection with my shop, I have a Buffalo drill press, a Star blower, and all hand tools that are needed. I get \$1.20 to \$1.50 for shoeing; 50c per wheel for shrinking buggy tires; 50c for wagon tires; 25c a set for sharpening cultivator blades; 15c for sharpening 10-in. steel plow; 25c for 12-inch; 40c for 14-inch, and 50c for 16-inch; \$1.00 for painting plow; \$1.50 for painting set of cultivator shovels; \$7.00 for new corn planter runs; \$6.50 for retiring buggy and \$9.50 for retiring wagon with $\frac{3}{4}$ by $1\frac{1}{2}$ -inch tires. I get \$3.00 for making wagon box and everything furnished. I am more than pleased with your paper and it sure hits the mark on every hand.

W. LEBAW, Missouri.

An Illinois General Shop.—I have taken the paper since 1908 and before that father and I took it together. I have all of the copies bound and I would not take a good deal for them.

The engraving shows a picture of my shop. It is 50 by 70 feet. I do all kinds of work but do not get the prices which I should because we have no organization here.

ELMER REED, Illinois.

On Welding Tires.—In reply to Ed. B. of Montana, first scarf the old way, then take an old blunt center punch or make a special punch and make a depression (not a hole) in bottom of scarf as shown at A. Now lap your scarfs as shown at B, then



THE ILLINOIS SHOP OF ELMER REED

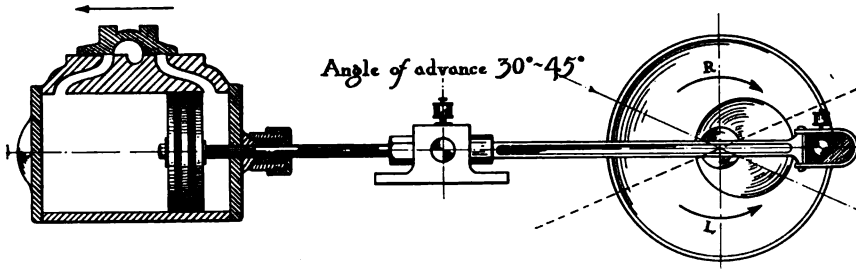


FIG. 1—CORRECTLY TIMING THE D-SLIDE VALVE ENGINE

take the punch and drive the tip of upper scarf down into the depression in under lap. By doing this way you not only save time, but get a chance to put compound between laps, as you can put them together any time once they fit. Be sure to have laps fit together before punching. A tire that is bent right and scarfed right very seldom will slip without anything to hold it of any kind.

E. BOWLEY, Connecticut.

Setting Eccentric on Slide Valve or Rocker Arm Engine.—In reply to W. D. B.; remove the steam chest on valve box cover so as to be able to observe the position of the valve on the valve seat. We will assume that the engine is of the horizontal type and runs to the right. In which case the center of the eccentric should be below the center of the disc or of main crank shaft of engine on the side next to the crank pin when the wrist pin is on the dead center of the outward stroke of engine, and the valve just beginning to open the port of cylinder next to cross head for the back stroke of piston.

Many engineers prefer to have the valve open about the thickness of good writing paper when the crank pin is on dead center. The accompanying diagram will help explain this. The direction of motion of an engine is taken when one stands facing the disc and the crank pin above the center of disc or crank shaft.

If the eccentric has become loose and displaced about the surest way to get it into position is to loosen the set screws so that you can turn the eccentric on main shaft, then throw both crank of engine and eccentric on the full out stroke to dead center farthest from engine cylinder. Turn the eccentric on shaft until forward point begins to open say 1-64-inch. Be sure to turn eccentric in the direction the engine is to run when doing this.

Rocker arm engines which cause the valve to travel in the same direction as the eccentric are adjusted the same as plain D-slide shown in Fig. 1. These are built with an under hung wrist pin to operate rocker shaft. Those with an overhung rocker shaft have the eccentric set in the opposite position to that of a plain D-slide engine.

By a "rocker arm engine" I understand the writer to mean an engine in which the valve works on a bored seat, somewhat after the manner of a Corliss engine valve. Many oil well drilling engines were fitted with that type of valve some years ago.

On many old-time engines there was no link reverse, and to save trouble of setting valve to reverse they were rigged with a rocker arm with two wrist pins. One overhung and the other underhung. The connecting rod to eccentric was moved from one wrist to the other to reverse engine. They were long stroke slide valve engines.

The reason why there is no fixed angle

of advance for engine eccentric is that the "cap" of valves differs in different engines; some overlap their seats more than others, and the eccentric must be so set as to open the valve at the proper point of stroke.

There has been a great deal written and said on valve setting but this, I believe, is the shortest and most practical way out of the woods.

Often an engine will not "cut off even" on account of not balancing the wear when putting in liners to take up lost motion on connection rod and eccentric; the rod becomes too long or too short for the valve to evenly open over the ports. If such is the case the valve must be brought into position by adjusting the rod, yoke or retaining nuts on the cut off or its connecting rod. All engines are provided with some means of making this adjustment. The trouble may be detected by measuring either the overlap or the opening of the valve on the ports and seat.

L. R. SWARTZ, Pennsylvania.



The Automobile Repairman

Wrenches for the Auto Smith

JOHN DENBO.

Seven out of ten smiths haven't anything in their regular equipment with which to do auto repairing, other than a few S-wrenches, a screw driver and a punch; at least it seems so. This state of affair is uncalled for, if some of us would get to thinking. Out in the scrap pile are a lot of springs, both buggy and express; perhaps some of you have a few old auto springs lying around.

"Our Journal" has told you how to make a wrench and it is very simple too if you remember. Split the spring down say 6 inches by $\frac{3}{8}$ —spread it out forming a T. Now lap ends back and weld down, then turn to fit nut. (see Fig. 1.)

Now to make a socket wrench, take a piece of radius rod and saw into $2\frac{1}{2}$ -inch lengths. Now use rod as close to size of nut as possible; get the piece hot, lay the nut on to the anvil, drive the piece of radius rod on it and shape it up while nut is still in the rod. To get the nut out, screw a bolt in to the nut, take it to the vice and pull it out.

When it comes to taking out a cap screw or the side bolts, make a long

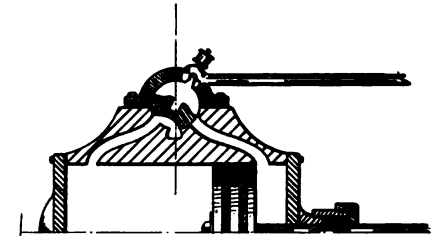


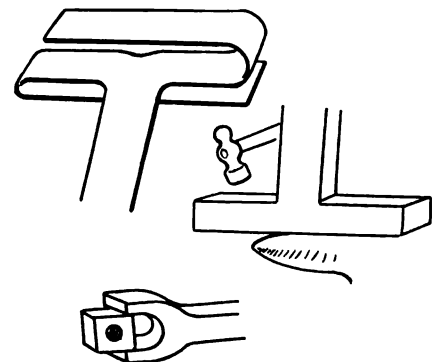
FIG. 2—THE ROCKER ARM ENGINE

brace with a square end on the shank to fit the sockets. Every time I come to a bolt hard to get at, I make a special wrench for it and I am saving time by it.

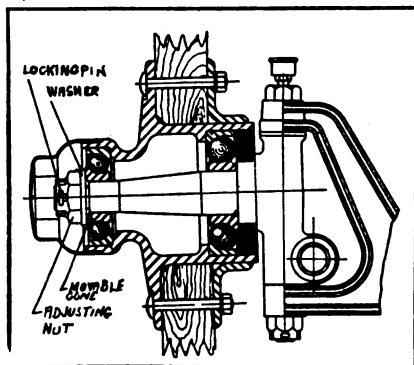
Adjusting Automobile Front Wheel Bearings

VICTOR W. PAGE, M. S., A. E.

Many automobile front wheels are mounted on ball bearings of the cup and cone type and unless these are adjusted carefully, the bearings will not give proper service. The common fault, when adjusted by the inexperienced, is to get the bearings too tight. This introduces wedging strains and results in the balls eventually grooving the raceways. The adjustment secured by a threaded



MAKING WRENCHES FOR THE AUTO



ADJUSTING AUTOMOBILE FRONT WHEEL BEARINGS

cone retention member, the cone of the outer bearing being movable on the wheel spindle so it brings the balls into intimate bearing with the raceway or cup pressed into the wheel hub. This pressure is translated through the hub to the inner bearing cup, then to the balls and cone, the latter being backed by an abutment or shoulder on the steering spindle. The bearings are angular contact types and when adjustment is correct, will resist both radial and thrust loads. The adjusting nut should be turned until the movable cone is seated firmly against its complement of balls. There should be no up and down "shake" in the wheel hub, yet the wheel should spin freely when rotated. If any appreciable effort is needed to turn the wheel, then the adjusting nut should be slacked off until the wheel turns freely. After the proper adjustment is secured, the nut should be kept from turning by inserting a split locking or cotter pin through one of the nut slots and a hole through the spindle. Bearings of this type should be maintained in correct adjustment, kept clean and thoroughly lubricated with a packing of pure mineral grease. The felt washer used as an oil retainer and dirt and water excluder must also be examined and if flattened down or hard so it does not perform its stated function properly, it should be replaced with a new one. Water is the greatest enemy to ball or roller bearings and must be excluder to obtain the proper service from them.

A Ford Gear Repair and Several Auto Repair Helps

JOHN DENBO

I visited a garage not long ago, one that I had often heard of as an up-to-date one. Being interested in

auto work, I made it a point to make myself acquainted with the proprietor. I expected to be presented to a business-looking man, a fellow with chin whiskers cut La France, but instead he was a man of different character altogether: a fellow from off the farm. He had a roomy garage of brick with concrete floors, a handful of tools and two helpers. In one corner was a work bench. Scattered on the top were a few monkey wrenches, a few cast iron, cheap wrenches and four or five battered up, split socket wrenches. But he was "doing" the work like nine-tenths of them. You can't tell how smart a man is as to mechanical ability, by the amount of tools he has in his shop. At the end of the work bench was a pile of discarded parts, one part in particular was a tripple gear from the Ford transmission. I asked him why he discarded them and he said they were beyond repair, but he was mistaken.

Here is how it could be fixed: Drive out three of the rivets and drive in three new rivets of soft steel buggy tire bolts and rivet them. Now take out two or three more rivets. The rest you can settle down with a

punch and you have fixed the trouble. These gears become loose and cause that grinding noise you hear while backing the car or in going on low or high. To examine these gears, take off the transmission cover placing finger on gear and moving the gear you can see them slide.

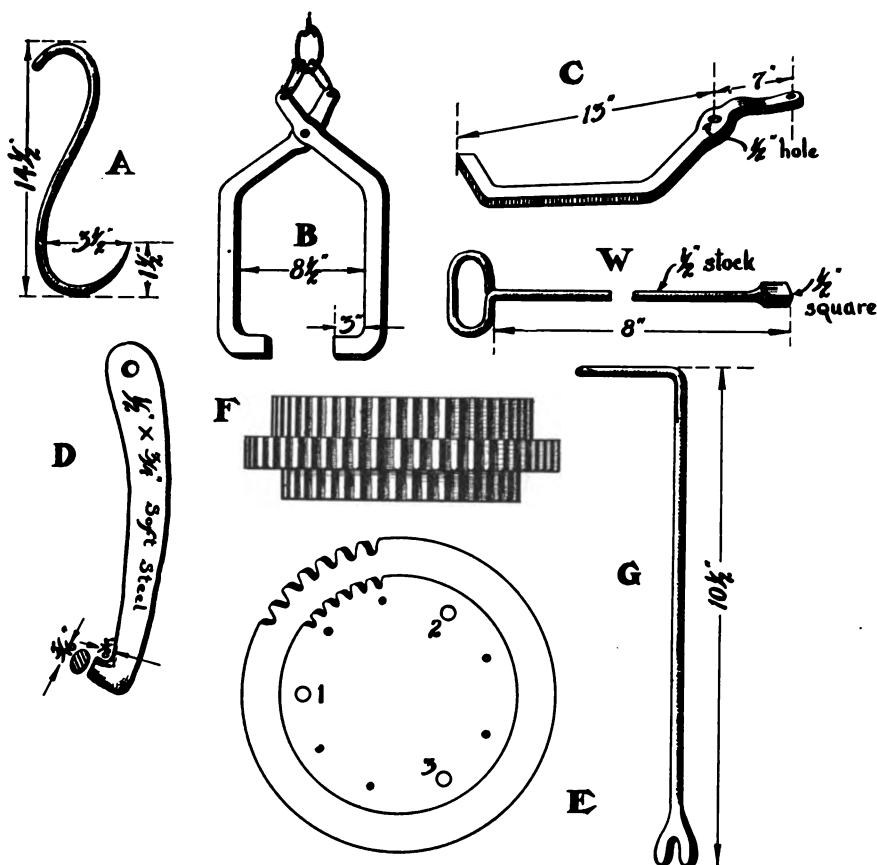
A pulling arm for use in pulling disk drums is shown at D in the engraving. These are used in pairs.

At G is shown a wrench made of $\frac{3}{8}$ -inch round stock, forked at one end, to turn the radiator or carburetor cock.

At W is a handle used to fit in socket after nut is loosened. It is very handy in taking under plate off of engine case.

At B is shown a set of hooks used to lift the engine out of a Ford, Metz or Maxwell.

A hook, A, is to lift on end at clutch spring while engine is being lifted, thus keeping engine level and eliminating all danger to magneto. You will find this to be a very handy tool with a block and tackle over head and all lifting is done very easily. The lifting tongs are made of one inch stock, the lifting hook of 3-8 or 7-16 round.



HOW THE FORD TRIPPLE GEAR WAS REPAIRED AND SEVERAL AUTO REPAIR HELPS



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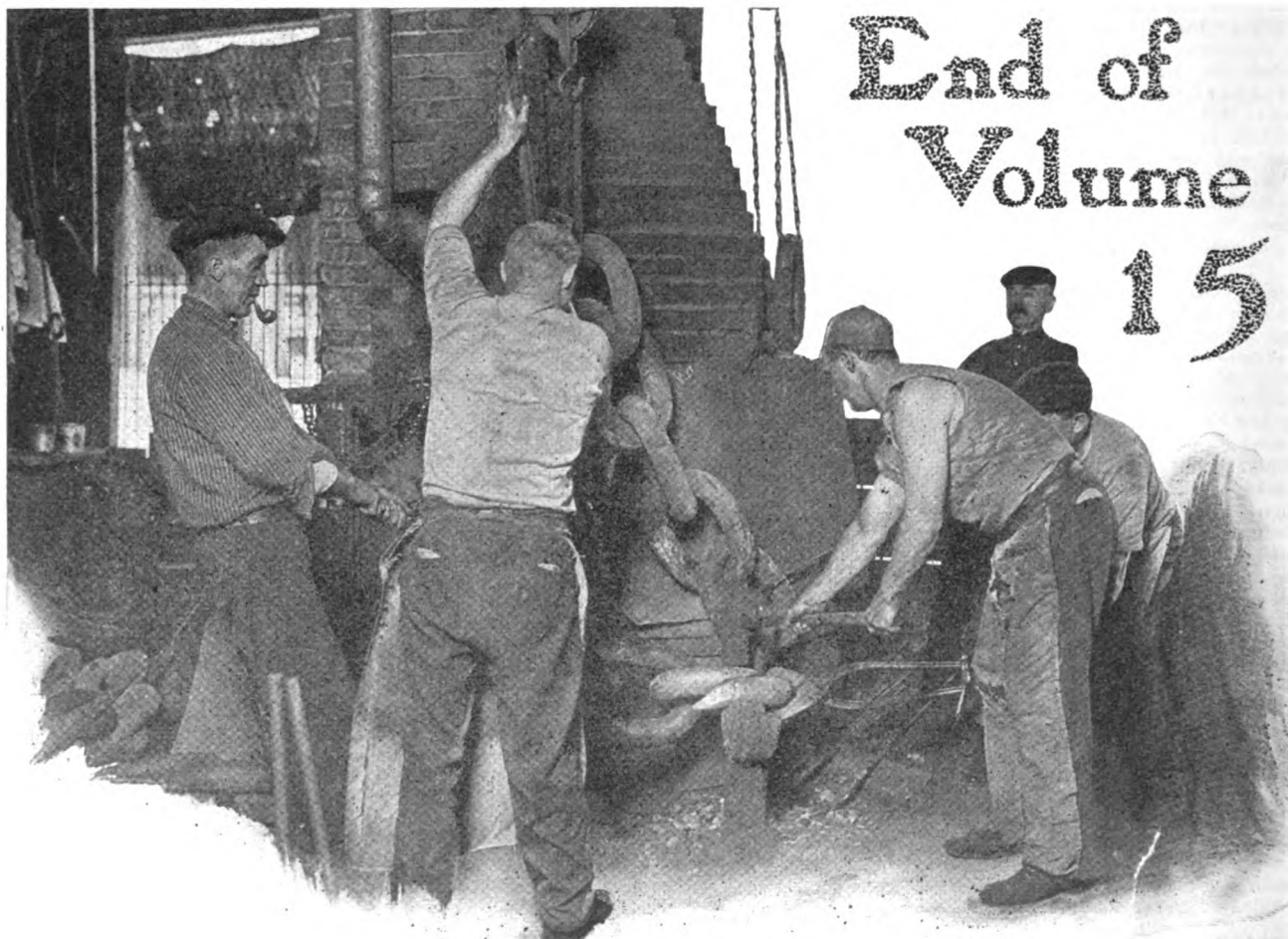
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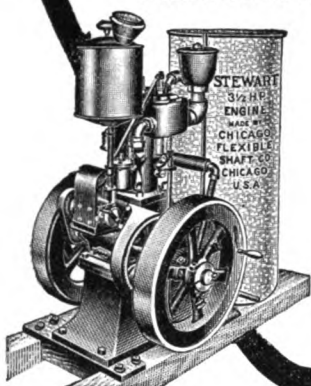
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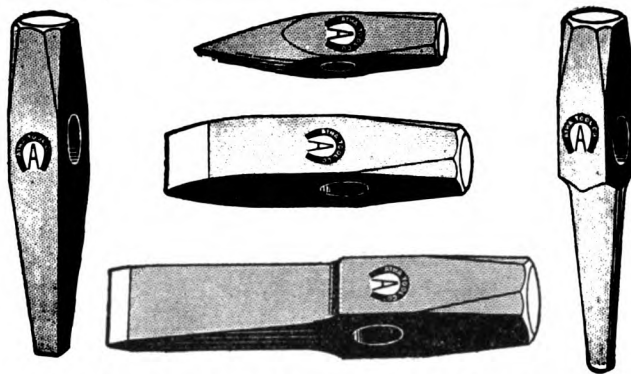
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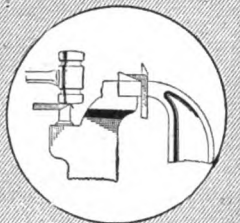
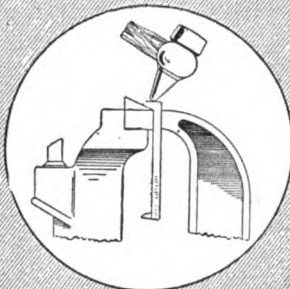
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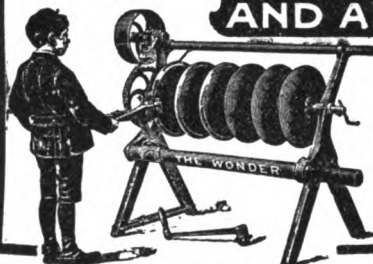
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TRADE LITERATURE AND NOTES.

The Witte Engine Works, makers of Witte Engines, have opened a Pennsylvania branch office in Pittsburg. This branch has been established in order to furnish quicker service to the Witte customers in that section. The branch is in charge of E. D. Voorhis, Pittsburg Manager, who was with the home office in Kansas City, Mo., for many years.

Practical Mechanics and Allied Subjects by Joseph W. L. Hale, S. B., E. E., 228 pages—bound in cloth—Price \$1.00. McGraw-Hill Book Company, New York. This book with "Practical Applied Mathematics" is intended for use by apprentices. It is bound uniform with the other volume and takes up the more advanced problems in which mathematics are used as a tool.

In this volume the author takes up the forces, gravitation and density and specific gravity. Chapters on screw threads, calculation of levers, pulleys, gears, belts and similar subjects are covered in this volume.

For the student and for the ambitious craftsman who is interested in not simply doing things but in knowing why certain things are done certain ways, this will be an excellent text book. The two volumes "Practical Applied Mathematics and Prac-

tical Mechanics" form excellent tools for the application of mathematics to mechanical problems. The modern shop man needs them.

A New Ford Engine Chart by Victor W. Page, size 25 by 38 inches, on heavy paper. Price, post paid, 25 cents or sh. 6d.

This Ford trouble chart is called "Location of Ford Engine Troubles Made Easy". It shows all parts of the Ford power plant in section and outlines, clearly all parts of the engine, fuel supply system, ignition system, and the cooling system. This chart is just the thing for systematically locating engine and power plant trouble and for correcting it. It is an excellent companion of handy information for use in connection with Mr. Page's latest book, "The Model T Ford Car".

William Wedekind of Hagerstown, Indiana, is advertising a special repair iron which he is making for use on broken shafts. This repair iron was devised by Mr. Wedekind as a result of his many years of smithing experience. By using one of these irons, he explains, a broken shaft can be fixed much quicker and with less labor. Mr. Wedekind is making a special offer to members of the trade and will send complete information about the repair iron to all smiths who

will write him, mentioning THE AMERICAN BLACKSMITH. Address, William Wedekind, Hagerstown, Wayne County, Indiana.

W. F. Young, the maker of Absorbine, which has long been advertised in "Our Journal", sends the following interesting testimonial from W. W. Goodliff, Bolivar, N. Y.:

"I have taken a bunch off a horse's knee with Absorbine and glycerine that a veterinary said was ruined for life. Today he is worth \$2,000. I am handling a good many horses and think that Absorbine will cure most anything".

For complete information about Absorbine address W. F. Young, P. D. F., 230 Temple St., Springfield, Mass.

Blacksmiths have been receiving this season copies of a special booklet being issued to the trade by the Muncie Wheel Company of Muncie, Indiana. This booklet has been brought out at this time to help the smith with his wheel work this Fall. The booklet contains information of general use and should make a worth while addition for every smith who has followed the excellent idea of starting a "Business Library" out of the many helpful works now being sent to the trade.

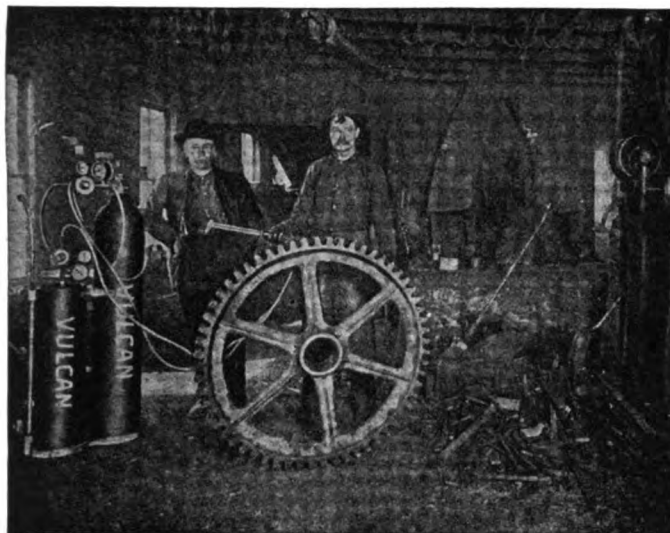
One page of particular interest contained in this booklet takes up the subject of special repair wheels. This is information of unusual value just now when the average smith will be called on to fix old wheels or supply new ones. The Muncie Wheel Company is prepared to furnish these special repair wheels made with a four-piece rim with the tires already on.

Any smith who has not received a copy of this book can have one without charge by writing to the Muncie Wheel Company, Muncie, Indiana, and mentioning THE AMERICAN BLACKSMITH.

Lubrication of the Motor Car Chassis.—This is not a book but a 24 by 38-inch chart which shows at a glance just the lubrication requirements of an automobile chassis. The chart represents a plan view of a typical six-cylinder chassis of standard design. All parts requiring oil are indicated clearly and the frequency with which these parts must be oiled and the kind of lubricant to use is also shown. This is an excellent chart to hang up in the auto-repair shop and garage. Price, postpaid, 25 cents or 1sh. 3d.

Dyke's Motor Manual—by A. L. Dyke,

(Continued on Page 34.)



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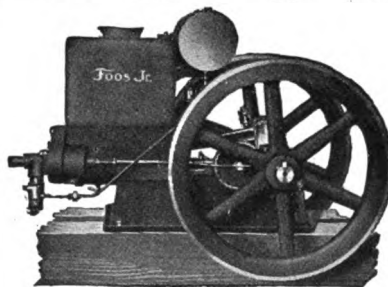
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Want and For Sale advertisements, situations and help wanted, twenty-five cents a line. Send cash with order. No charge less than fifty cents. The small cost of these advertisements prevents our investigating and guaranteeing them. **WE WILL NOT knowingly accept any but reliable ones.**

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P. O. Box 974, BUFFALO, N. Y., U.S.A.

TRADE LITERATURE AND NOTES.

(Continued from Page 14.)
M. E., 220 pages. Illustrated—Cloth.—Prices, \$2.20 prepaid.

This book is by the same author as the now well known Automobile Encyclopaedia. This new book by Mr. Dyke covers the subject of motors and motor application other than in the automobile. Motorcycles have gained a vast popularity and so have motor boats, and in this Motor Manual the motorcycle and light car is given attention. The marine engine and motor boat, also the submarine boat, the stationary gasoline and oil engine, railway motor cars, gas producers, air craft and aero engines, the steam car, are all covered in this book. The chapters on engine troubles and on overhauling and repairing engines make the Motor Manual a practical book for the repairman and home mechanic. An index enables the reader to readily find the information he desires. Altogether Dyke's Motor Manual is a good book for the motor operator, repairman and garage man.

(Continued on Page 42.)

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This portable outfit contains every necessary article to make a successful start. Considering its **high** efficiency, it is remarkably **low** priced.

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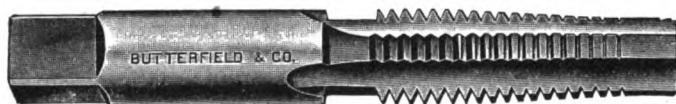
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TRADE LITERATURE AND NOTES.

(Continued from Page 34.)

The Model T Ford Car, by Victor W. Page, M. E. 300 pages, 5x7. Illustrated, Cloth, \$1.00 or 4 sh-6d.

This book by the well known author of "The Modern Gasoline Automobile," is an excellent work on "The Universal Car." All parts of the Ford car are described and illustrated and it would seem as though every detail of operation, care and repair of this popular machine has been included in this excellent 300-page book.

The book is by a recognized engineer on automobile matters who has driven and repaired Ford cars and is well able to tell about it. The book is written so all can understand it—plain every-day language is used for the practical instructions. Anyone operating, caring for or repairing Ford cars will want this book. Every repair man will find his Ford work easier if he has one of these books handy.

The Wheel, Top & Hardware Co. of Cincinnati, Ohio, has been sold to the Brown Carriage Co. of Cincinnati, Ohio, who are continuing the business.

During the past few months internal strife as to the management had developed to such an extent that a Receivership was decided upon and two (2) officers of the company, Mr. W. W. Boob and Adam Metzger, were appointed Receivers by the Court.

Because of the flourishing condition of this business, the Receivers have had no difficulty in finding a buyer for this business as a going concern and the company, after being closed for several days while the sale was being completed, is again in full operation as before. The name of the company will be continued and all orders and communications should be addressed as before, to Wheel, Top & Hdwe. Co., Syncamore & Canal, Cincinnati, Ohio.

As an example of the constantly increasing opportunities for smiths to earn extra money by acting as agents for articles in which their customers are interested, it will pay every smith to investigate the agency offer of the Chicago

Flexible Shaft Company which has been appearing in "Our Journal."

The Chicago Flexible Shaft Company has long been known to the trade as the manufacturers of the Stewart Horse Clipping Machine and more recently as the makers of Stewart Engines. These engines are built especially for farm work, being made in three sizes, 1/2, 2 and 3 1/2 H. P. They have made a fine record for economical operation and steady service, which are features that make a strong appeal to the farmer.

In order to get in close personal touch with the farmers, the Chicago Flexible Shaft Company now propose to appoint agencies among the smiths. This would appear to be a worth while connection for the shop owner as he is in a position to demonstrate the engine while it is working in his own shop and while his prospective customers are waiting for a shoeing or repair job to be finished. Complete information can be obtained by writing to the Chicago Flexible Shaft Company, 188 Ontario Street, Chicago, Ill., mentioning THE AMERICAN BLACKSMITH in the letter.

Among the new machines being brought out this fall by the Parks Ball Bearing Machine Company is a new Upright Hollow Chisel Mortiser and Borer. This machine will be of particular interest to the smith with considerable vehicle work as it is an entirely self-contained outfit and can be used independently of other shop equipment.

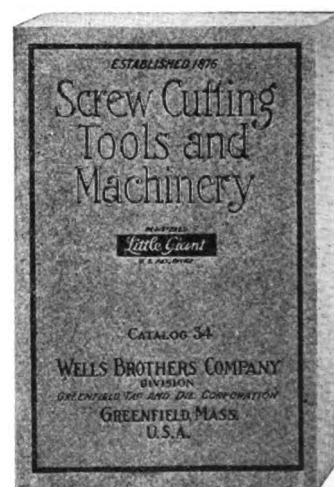
Taking up small floor space and requiring little power, this machine has been designed for producing accurate mortises and can be used in all wood working shops. It is equipped with an easily adjustable table which can be arranged for working wood of different thicknesses.

Simple control is assured by a hand wheel in front while the guide bed rests on a tilting device which can be tilted to a 45-degree angle. The chisel is controlled by a foot treadle which leaves the hands free to handle the work. Complete information about this Upright Hollow Chisel Mortiser and Borer will be sent to all readers of THE AMERICAN BLACKSMITH who write to the Parks Ball Bearing Ma-

chine Company, Cincinnati, Ohio, and mention "Our Journal" in writing.

The new catalog just issued by the Wells Brothers Company Division of the Greenfield Tap and Die Corporation will prove of considerable interest and value to every shop owner. Among the large variety of assortments listed in this book are taps and dies, horseshoe calk taps, bit brace tools, threading machines, reamers and other dies, taps or screw cutting machinery constantly used by the smith.

This catalog makes a handy reference book for everyone using screw cutting



tools or their kindred appliances and machines. Where special appliances are required the Wells Brothers Company is prepared to make them as desired. The book is attractively, accurately illustrated and is of a handy size for constant use. To obtain a free copy of this helpful catalog address the Wells Brothers Company Division, Greenfield Tap and Die Corporation, Greenfield, Mass., mentioning THE AMERICAN BLACKSMITH.

Wentworth Institute, Boston, Mass., sends out its catalogue for 1915-1916. This school was founded by Arioeh Wentworth "for the purpose of furnishing education in the mechanical arts." Its courses include day courses, evening shop courses and evening technical courses, and besides the courses announced in its previous catalogues, Wentworth Institute has added two new courses. The first is a one-year day course in Forging, Hardening and Tempering. This course is intended to give training to young men who wish a thorough knowledge of both hand and machine forging in wrought iron and steel. The second new course is a one-year Trade Preparatory course and is intended for young men who wish to enter one of the manufacturing industries, but who wish to discover in which direction they show special skill and ability.

Anyone thinking of taking up a course of technical and mechanical instruction should get a copy of the new Wentworth catalogue. Write to Arthur L. Williston, Principal of Wentworth Institute, Boston, Mass.

When you write to advertisers in reference to anything advertised here, please mention The American Blacksmith.



CURRENT HEAVY HARDWARE PRICES.

The following quotations are the lowest prices generally prevailing September 22, 1915. They are subject to change without notice, and higher prices are charged according to quality, specifications and other conditions.

True to our prediction last month Steel Bars have advanced. The new rate of \$1.95 will be found in the proper column. This is, of course, the Chicago price—other points quoting prices according to freight differences.

Another reduction in galvanized sheets is reported with an advance in steel shafting and a tightening of rivet and bolt quotations.

The wet weather during the past month has retarded vehicle lines and this season—a time that is usually described as brisk—trade has not been up to normal.

Prices on Leader Nails have been advanced by the factory and a quotation of \$2.25 is looked for from jobbers after October 1st.

Collections are improving, some reporting them as very favorable with continuing brighter prospects.

Horse Shoes—	
All Iron Shoes	\$4.00
Steel Shoes	4.00
No. 0 and No. 1, 25c extra. 15c. per keg additional charged for packing more than one size in a keg.	
Mule Shoes	4.90
X. L. Steel Shoes	5.50
Countersunk Steel Shoes	5.25
Tip Shoes	5.75
Goodenough, heavy	6.00
Goodenough, sharp	6.50
Toe Weight	7.00
Slide Weight	9.25
E. E. Light Steel	5.00
Steel Driving	5.50
O. O. Mule Shoes, extra	1.50
Anvils	.11

Merchant Bar Iron—
\$1.95 rates, full extras, and 20 cents per 100 pounds extra for broken bundles.

Steel Bars—	
\$1.95 rates, full extras.	
Toe Calks—	Per Box
Blunt	\$1.25
Sharp	1.50

Screw Calks—	5-16	%	7-16	1/2	%
Blissard M..	\$18.00	\$18.00	\$20.00	\$20.00	\$22.00
Sure Grip M.	18.00	18.00	20.00	20.00	22.00
Bl. D'mond M.	18.00	18.00	20.00	20.00	22.00
Red Tip M..	20.00	20.00	22.00	22.00	24.00
Rowe, Jr. M.	18.00	18.00	20.00	20.00	22.00
R. R. Pt. M.	20.00	20.00	22.00	22.00	24.00

Plow Lays—	
Solid Cast	\$.08%
Crucible	.09%
Soft Center	.18

Fitted Plow Lays—	
Crucible, 12"	\$1.20
Crucible, 18"	1.80
Soft Center, 12"	1.95
Soft Center, 18"	2.60

Quick Repair Lays—	
Crucible, 12"	\$1.20
Crucible, 18"	1.80
Soft Center, 12"	1.70
Soft Center 18"	2.15

Hickory Lumber—Per Foot—	
1 to 2 1/2	\$.10
3 1/2 to 4 1/2	.12

Ash and Oak Lumber—Per Foot—					
1	—1½	\$	.08	2½—3.....	\$.08
1½	—2		.08½	3½—4.....	.10

Yellow Poplar Lumber—Per M. Feet—	6 to 12	12 to 17	18 to 24
3/4"	\$75.00	\$75.00	\$85.00
1/2"	75.00	78.00	90.00
3/8"	78.00	85.00	95.00
1/4"	85.00	90.00	114.00
3/16"	85.00	90.00	114.00

Rough Hickory Axles—	
3 x 4 x 6 ft.	\$.75
3 1/2 x 4 1/2 x 6 ft.	1.00
4 x 5 x 6 ft.	1.30
5 x 6 x 6 ft.	2.40
4 x 5 x 6 1/2 ft.	1.75
4 1/2 x 5 1/2 x 7 ft.	2.30
5 x 6 x 7 ft.	2.80
5 x 7 x 7 ft.	3.40

Finished Hickory Axles—	
For 2 1/2 and 3 1/2 Skeins	\$.95
For 3 Skeins	1.10
For 3 1/2 Skeins	1.35
For 3 1/2 Skeins	1.50
For 3 1/2 Skeins	1.80
For 4 Skeins	2.10

Rough Oak Bolsters—	4 x 4 1/2	12 x 14	16 x 16
3 x 4	\$.36	\$.40	\$1.35
4 x 5	.60	.70	2.25
5 x 6	1.00	1.20	3.00

Finished Oak Bolsters—	
2 1/2 x 3 1/2 and under	\$.60
3 x 4	.65
3 1/2 x 4 1/2	.80

Rough Oak Wagon Tongues—	
4 x 4 x 2 x 4 x 12 and smaller	\$1.15

Finished Oak Wagon Tongues—	
3 1/2 and smaller	\$1.35
3 1/2	1.45
4	1.55

Two-Inch Sawed Hounds	Per Pair
Tongues	\$.35
Front	.40
Hind	.50

Wheels—	
Sarven Patent—white—not tired	50%
Tiring—No. 13 and less	45%
Tiring—No. 17 and larger	30%
Screws 1 1/2" Thread and less	50%
Rivets 1 1/2" Thread and less	40%
Screws or rivets 1 1/2" and heavier	40%
Boring or Boxing less than 10 cent lots	40%
Boring or Boxing 10 sets or more of one size	60%
Priming Wheels, net.	25c
Oiling, not tired, set.	20c
Allowance of 25c per set on all special tired wheels with three or four piece rims.	
Oiling, not tired, No. 17 to No. 39	25c
Oiling No. 45 and larger	40c

Special Wheels Tired—"E"		Grade.	2 piece Rim.		
0	$\frac{3}{8} \times \frac{1}{4}"$	\$6.95	9	$1\frac{1}{2} \times \frac{1}{4}"$	\$ 9.35
1	$\frac{3}{8} \times \frac{1}{4}"$	7.20	9	$1\frac{1}{2} \times 5-16"$	9.80
3	$1 \times \frac{1}{4}"$	7.65	13	$1\frac{1}{2} \times 5-16"$	12.00
3	$1 \times 5-16"$	7.90	18	$1\frac{1}{2} \times \frac{3}{8}"$	12.40

Cupped Oak Hubs.		Plain End Oak Hubs	
7 x 8 x 9..	\$1.15	10 x 14.....	\$ 3.80
7 x 9 x 10..	1.25	11 x 14.....	4.20
8 x 9 x 10..	1.25	11 x 15.....	4.50
8 x 10 x 11..	1.50	11 x 16.....	5.10
9 x 10 x 11..	1.69	12 x 16.....	5.75
9 x 11 x 12..	1.80	12 x 17.....	6.30
10 x 12 x 13..	2.75	18 x 18.....	7.00
11 x 13 x 14..	3.90		
12 x 14 x 15..	4.50		

Rough Sawed Fellos—			
1½ x 2".....	\$1.70	2 x 2½".....	\$2.10
1½ x 2½".....	1.90	2½ x 2".....	4.60
1½ x 2¾".....	2.00	3 x 3".....	5.60
3 x 3½".....	\$5.75		

Ironed Poles, White, XXX—	
1/2 x 2 1/2" No. 2	\$3.80
2 x 2 1/2" No. 3	3.80

Ironed Shaft, White, XXX—	
1 1/2 x 2" and smaller	\$1.95
1 1/2 x 2"	2.20
1 1/2 x 2 1/2"	2.70

Farm Wagon Bows—	
Round Top, 1/2 x 2"	\$.80
Flat Top, 1/2 x 2"	.75
Round Top, 3/4 x 2 1/2"	1.35

Standard Size Piano Bodies with Seats—	
Each	\$4.25

Plow Beams—	
1 Horse	\$.60
2 Horse	.75
3 Horse	1.10

Spokes and Rims—	
Oak and Hickory Spokes, net on Wels & Lash List No. 6.	
Finished Rims—XX—1/2"	\$1.50
Finished Rims—XX—1"	1.65
Oak Rims—Discounts.....	40-10%
Hickory Rims	40%

Wagon Neckpoke Woods—	
Keller & Tamm's List—Discount.....	25%

Wagon Whiffletree Woods—All Grades—	
Keller & Tamm's List Discounts.....	25%

2 1/2 x 40"....	2.40	
Wagon Evener Woods—		
2 x 4 and 2 x 4 1/2—Keller & Tamm's List—		
Discount		80%

Wagon Evener Woods—	
2 x 4 and 2 x 4 1/2—Keller & Tamm's List—Discount.....	80%
Larger	25%

Buggy Evener Woods—All Grades	
Keller & Tamm's List—Discount.....	25%

Buggy Whiffletree Woods—	
Mixed Second Growth and Second Growth—Keller & Tamm's List—Discount.....	20%

Buggy Neckpoke Woods—All Grades	
Keller & Tamm's List—Discount.....	20%

ENGINE PRICES LOWER

200,000 customers testify to quality of Galloway-built goods. Our engines made in our factories. Modern design. Built for long, hard, continuous users' satisfaction. Don't buy until you investigate these heavy-weight, long stroke, large bore, low speeded, heavy duty engines. Engine book free. WM. GALLOWAY CO., Box 726, WATERLOO, IOWA.

1795 1/2 H.P.

9875-7750-3950-3475-2675

SIMONSEN

Hot Trimming Shear

Handiest Tool For Cutting Hot Iron And Plow Steel About The Forge. Ask any jobber or write us for circulars showing this, and our all wrought shears for cold shearing.

SIMONSEN IRON WORKS

Box 671 Sioux Rapids, Ia., U.S.A.

WE MAKE STEEL WHEELS TO FIT ANY AXLE PLAIN OR GROOVED TIRE

STEEL OR HICKORY AXLES ANY SIZE

OUR GROOVED TIRE A FULL LINE OF WOOD AND STEEL FARM TRUCKS

With Steel or Wood Wheels

WRITE FOR LARGE CATALOG and PRICES

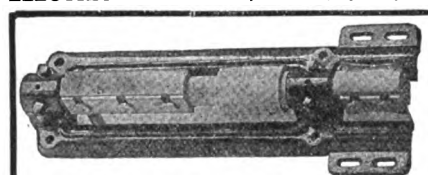
ELECTRIC WHEEL CO., Box A, Quincy, Ill.

OUR GROOVED TIRE A FULL LINE OF WOOD AND STEEL FARM TRUCKS

With Steel or Wood Wheels

WRITE FOR LARGE CATALOG and PRICES

ELECTRIC WHEEL CO., Box A, Quincy, Ill.

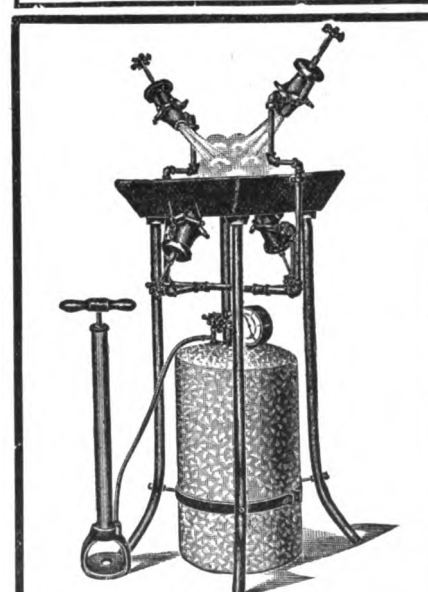


This is a 9 in. jointer and a 4 in. rounding head. Made of one solid piece of steel and mounted in a heavy cast frame. It is easily mounted on a simple wood table that any handy man can readily make.

It will joint and plane lumber, round tongues, coupling poles, doublers, etc., and chamfer or round circular work as hounds, fellos. It will bore holes in wood and tenon spokes.

Write for prices and circulars. For sale by leading jobbers or direct.

W. L. Sherwood Kirksville, Mo.



Best Gasoline Brazing Forge

IN THE WORLD

Thousands sold in last ten years. Four sizes. Send for Catalog.

The National Cement and Rubber Co.

308 S. St. Clair Street Toledo, Ohio, U. S. A.

"NEW EASY" 4 Sizes BOLT CLIPPERS "EASY" 2 Sizes

THE GENUINE TOOL

KNOWN AND PREFERRED EVERYWHERE

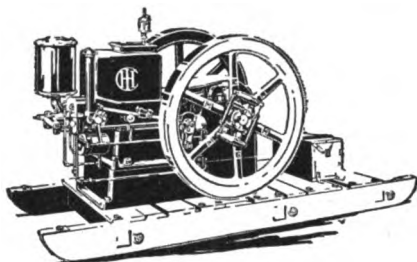
H. K. PORTER EVERETT, MASS. U. S. A.



THIS MAN KNEW!

"I realized," said a certain manufacturer who has just re-equipped his plant with engine power, "that nothing about my place means so much to me as reliability of power. Things **MUST** go right—I **MUST** be able to depend on things running smoothly without delay and stoppages, or I lose money fast. Anything less than absolutely the best to be had in quality is false economy. I know that from experience." This man's plant now runs on

International Harvester Oil Engine Power



Any man, whether large or small user of power, who looks till he finds the right engine, who studies most carefully all details of engines on the market, inevitably buys an I H C engine—Titan or Mogul. No engines last longer, run more steadily, deliver more power—are more uniformly satisfactory than International Harvester engines. They are built in all styles, in sizes up to 50 H. P., run on any one of a half dozen different fuels, built for any particular need—your need.

International Harvester engines, Titan or Mogul, are worth knowing about. Write for a catalogue, showing an interesting array of special features, and we will tell you where you can see the engine.

International Harvester Company of America
(Incorporated)
Harvester Building Chicago U S A



TWO BIG HELPS
IN WELDING
DON'T BE WITHOUT THEM



"E-Z" Welding Compound

is the best **BECAUSE** it works equally good on all kinds of steel. It welds at **lower heat** than any other. It **sticks** to metal at a **very low heat**. It leaves **no scale**. Use it once and you will always want it.

Crescent Welding Compound

makes smoother welds than any other. It is fine for plow work or where parts are fastened together before welding, or for making split welds, finishing heats, or for welding under dies, etc., etc. It insures smooth finish and perfect welds on Toe Calks.

"Money back" from any jobber if "E-Z" or Crescent does not give perfect results.

We Will Send Samples Free.

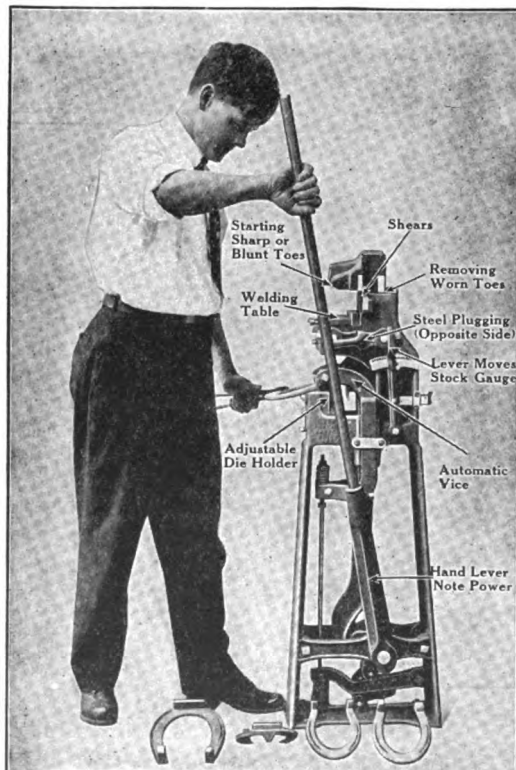
Made only by

Anti-Borax Compound Co.

FORT WAYNE, IND.

The Greatest **LABOR SAVING**
Machine on Earth

THE L. S. P. CALKING MACHINE

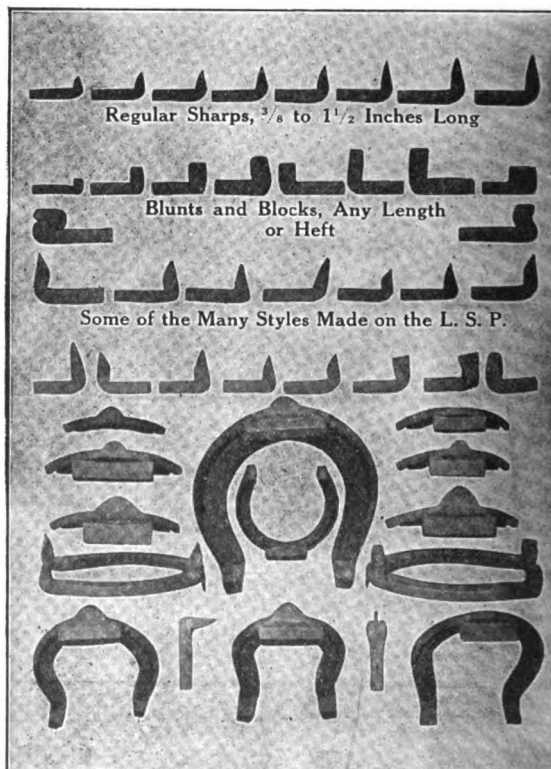


1916 MODEL—AN ENTIRELY NEW MACHINE.
Fully covered with Patents.

Our 1916 MODEL is far superior in every way to our former styles, doing a much larger range of work and a more finished job, much handier and easier to operate.

It is a strong, handsome, well-made machine, weighing 60 pounds more than our former style, but only takes up 8 x 15 inches floor space. No foot Treadle to bother, both feet on the floor. Automatic Vise which holds the shoe rigid. It does all kinds of Sharp, Blunt and Block Heeling. Starts the Toe Calks without use of hammer, removes the worn toes, welds Sharp and Blunt Toes, does Steel Plugging, rolls out a perfect, finished Clip. Work better than done by hand, with ease and in a fraction of the time. The Greatest Time and Labor Saving and Money Making Machine that ever went into a Shoeing Shop.

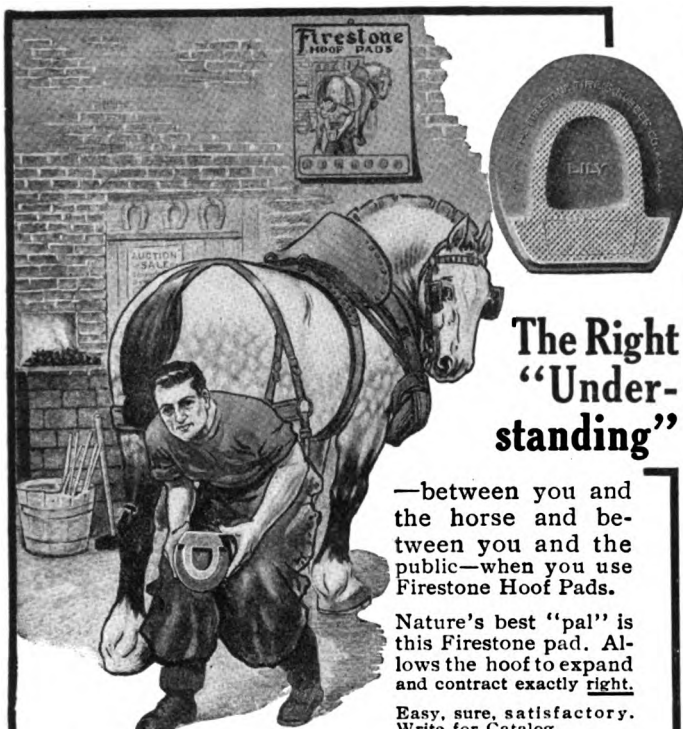
Write at once for
full description
and prices.



The above is an actual photograph of some of the work, just as it came from the machine without a hammer touching it.

L. S. P. CALKING MACHINE COMPANY

WYALUSING, PA., U. S. A.
NATIONAL MACHINE CO., BRIGHTON, ONT., CANADA

The Right "Under-standing"

—between you and the horse and between you and the public—when you use Firestone Hoof Pads.

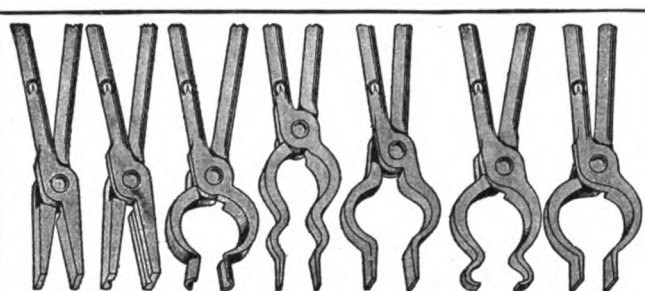
Nature's best "pal" is this Firestone pad. Allows the hoof to expand and contract exactly right.

Easy, sure, satisfactory. Write for Catalog.

FIRESTONE TIRE AND RUBBER COMPANY
Akron, Ohio—Branches and Dealers Everywhere

Pneumatic Tires, Truck Tires, Pleasure Electric Tires, Motorcycle Tires, Fire Apparatus Tires, Rims, Tire Accessories, Etc.

Firestone HOOF PADS



Atha "Horseshoe" Brand Tongs

Only a few styles shown here and mainly for the purpose of reminding you that "Horseshoe" Brand Tongs are of the same high grade of workmanship and material as distinguishes all blacksmith tools so branded.

We make them in many different patterns and each pattern in such a variety of sizes as enables us to fulfill your requirements for practically any work you may have in hand requiring the use of such a tool.

Remember the trade-mark, which is your guarantee that quality is the distinguishing feature of all ATHA TOOLS.



THE ATHA TOOL CO.,
NEWARK, N. J., U. S. A.



MR. BLACKSMITH

"NORTON GRINDING WHEELS WILL SAVE YOU MONEY"

The wise buyer no longer makes a mere request for a "grinding wheel." Science has provided a means of manufacturing grinding wheels that can be adapted to the work and now he specifies "Norton ALUNDUM or CRYSTOLON Grinding Wheels."

ALUNDUM Grinding Wheels are composed of an artificial abrasive whose hardness, sharpness and toughness can be controlled during manufacture. They are largely used for grinding steel and steel alloys.

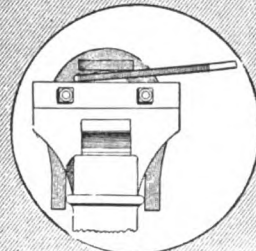
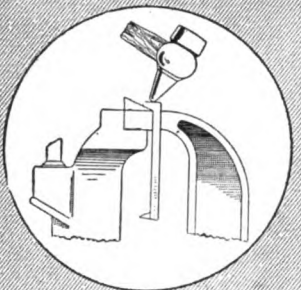
CRYSTOLON Grinding Wheels are also an electric furnace product, chiefly used on such materials as cast iron, brass, bronze, aluminum, etc.

Economy and efficiency in grinding result from selecting the right wheel for the work—one of the proper grain and grade. The grain must be of the right degree of toughness and the "grade", or bonded strength of the wheel, of the right consistency. Our experience will help you to select the proper wheel. Write us.

Our booklet, "ALUNDUM and CRYSTOLON Grinding Wheels", contains much valuable information. A postal card will bring it.

NORTON COMPANY, :: **Worcester, Mass.**
Chicago Store, 11 No. Jefferson St., New York Store 151 Chambers St. 788B





THE IMPROVED FULLER FOOT VISE

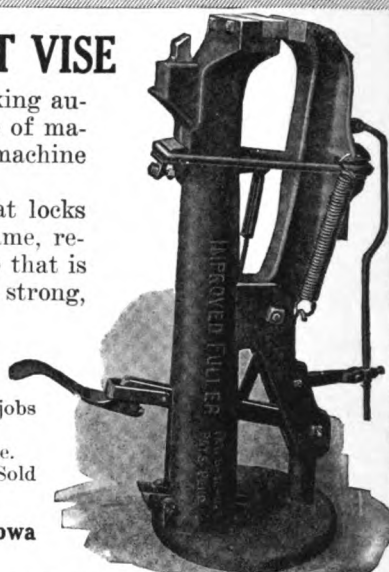
Once a user—always a user. The only self-locking automatic adjusting foot vise on the market. Made of materials and workmanship that guarantees the machine for life.

Not an ordinary foot vise, but a foot vise that locks instantly with light, even pressure always the same, regardless of the thickness of stock and with a grip that is equalled only by a heavy screw vise. Simple, strong, durable and backed by a life guarantee.

For sharpening heel and toe calks, pulling off old toes, hot rasping, steel plugging, turning ordinary mud calks, knocking out sickle sections, upsetting thin iron bending angles, traveling tires and a hundred other odd jobs about the shop.

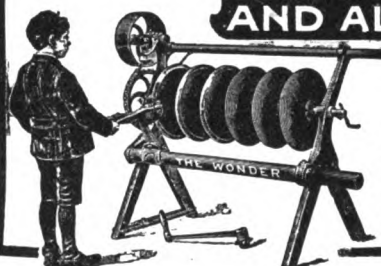
The price is but little more than the ordinary foot vise. Send for our attractive circular describing this vise. Sold by all dealers. Act today.

C. & E. Manufacturing Company, Marshalltown, Iowa



WONDER DISC SHARPENERS

SAVE 1/2 THE TIME
AND ALL THE LABOR



THE WONDER is the only machine adjusted to all conditions.
Can shear any part of edge to any bevel.
Can shear back from edge as far as required.
Can use tool on either side of disc.
Can shift from one disc to another.
Can do all this without the turn of a set screw or nut, is a positive feed, automatically adjusts itself to wobbling or bent discs; knives made of best grade selftempered steel; will last a lifetime; for hand and power. For prices, write to your jobber or

A. E. DURNER, Manufacturer

Main Office: Evansville, Wisconsin, U. S. A.
Made in Evansville, Wis., and Brandon, Man., Canada

Crescent Machine Company, 77 Main Street, Leetonia, Ohio, mentioning THE AMERICAN BLACKSMITH in your letter.

W. F. Young of Springfield, Mass., the maker of Absorbine, is quite well known to readers of this column as he likes to send us letters from smiths and farmers who find Absorbine a valuable horse remedy. Here is a typical letter from W. E. Valentine of North Haven, Conn.:

"I have used your Absorbine several years with great success. I would not be without it. Three years ago I had charge of a large contractor's stable. One of the horses had a large swelling come just below the knee. The proprietor called the state veterinary and he said that the animal had a spavin coming. I sent to our dealer for some Absorbine and had it applied freely and often. The result was that in three weeks the swelling was gone and did not appear again and the horse was as good as ever."

The complete information about the many uses for Absorbine is well worth having and can be obtained by writing to W. F. Young, P. D. F., 230 Temple Street, Springfield, Mass.

The promoters of the six-day bicycle race in Chicago last winter sensed the fact that the time was ripe for a revival of bicycle racing. The large crowds that turned out to see the race proved that their "hunch" was indeed a happy one.

All over the country the racing fever is spreading. In a score of cities new race tracks have been established. One of the best known of these tracks or velodromes, as they are called, is at Riverview Park, Chicago.

An interesting effect of the revival of racing is having on the bicycle industry as a whole is reported by the Mead Cycle Co. of Chicago. They say they are doing the largest business in their history and that the demand for machines of the racing type is taxing their capacity.

A very practical development in the trade generally, resulting from the revival of the racing fever, is a tendency to swing away from the heavy machine, loaded with superfluous equipment, back to the old style—light-weight, stripped machine.

The new catalog of the Meade Cycle Co. is very valuable for the person who is
(Continued on Page 17.)

"Bay State" Carriage and Tire Bolt Ratchet Wrenches

Labor
Savers!
Money
Savers!



Three Sizes
Take Hex and
Square Nuts

GEO. A. CUTTER, Sales Agent, Taunton, Mass.

Ask Your Dealer

TRADE NOTES AND LITERATURE

The smith who sees a busy season ahead this fall will find it well worth while to give careful attention to the advertising pages of this issue of "Our Journal." Many helpful suggestions, for both improved equipment and methods, often can be gained by a careful review of the ads, and this will be found especially true in connection with this November number.

One of the interesting series of advertisements now appearing in the paper is a strong appeal for "Safety First" made by The Barcus Manufacturing Company, Wabash, Ind., makers of Barcus Horse Stocks. These ads have contained striking illustrations of the danger the smith is running when he attempts to handle horses of unknown temperament without the protection of dependable stocks. Some very interesting information on this vital subject will be sent to every smith writing to The Barcus Manufacturing Company, Wabash, Ind., U. S. A. THE AMERICAN BLACKSMITH should be mentioned when you write.

Along the same line of "Safety First" the Crescent Machine Company, makers of the Crescent Universal Woodworker, have brought out a new Saw Guard that fur-

nishes ample protection and yet is not in the way or hinders convenient operation.

The Crescent Machine Company had their attention called to the need of such a protective device, that would at the same time not be a hindrance to good work, by the number of mills and shops that were equipped with "Safety First" appliances which the men simply would not bother to use.

This Crescent Saw Guard is a very efficient yet practical protection for the operator of a saw table and it is described as being adaptable to every known make of saw tables. The guard will automatically return to the table after the lumber has been passed through the machine.

If for any reason it is desirable to have the guard held out of position, a convenient latch holds it suspended above the table. The pressure of the finger on the latch will release it instantly so that it will return again to the protective position without further attention from the operator. By loosening a hand wheel on the main shaft that holds the guard it is possible to swing it clear out of position when for any reason it may be necessary or desirable to do so.

Considerable valuable additional information can be obtained by writing to The



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"GEARS AND WAGONS"

Selle Gears

A quarter of a century of success has placed "Selle Gears" and Wagons in the hands of the largest wagon users in the world. Express and Transfer Companies, Department Stores, Fire Departments, etc., specify "Selle Gears" and will take no other after once tried.

230 page catalog free.

THE AKRON-SELLE CO.

Akron, Ohio

HARVEY BOLSTER SPRINGS

Also Carriage and Auto Springs
Sold by leading jobbers or write us.

Harvey Spring Co., Box 31, Racine, Wis.

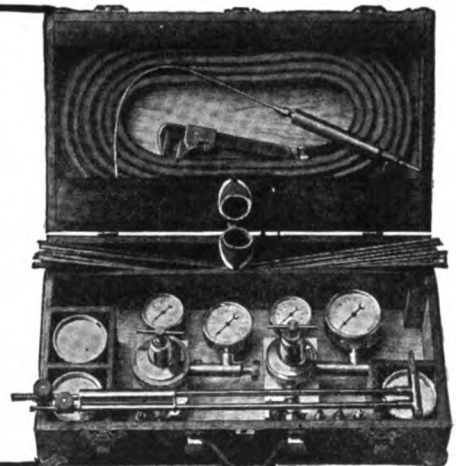
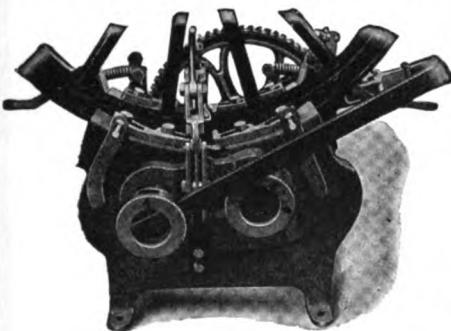


The Brooks Machine Company

MANUFACTURERS OF

Oxy-Acetylene Welding machines that generate both gases, also welding outfits to be used with cylinder gases, and the Brooks famous cold tire setters, which are endorsed and in use in the shops of the United States Government. Be sure and get our printed matter before buying. NOTHING BETTER MADE THAN A BROOKS. Write us today.

Wichita, Kansas, U. S. A.



TRADE NOTES AND LITERATURE

(Continued from Page 14.)

interested in the purchase of a new machine, or providing equipment for the old machine. Any reader can secure a copy by addressing The Mead Cycle Company, Dept. G-229, Chicago, Ill.

The smith who is called upon to handle considerable repairs on Ford cars will be interested in a new garage repair set now being made by the Wells Brothers Company, Division of the Greenfield Tap and Die Corporation. This set is based on the experience of repair men who handle a large amount of Ford repairs and is designed to contain all the necessary taps, dies and reamers for handling the class of work required by the Ford type of cars.

In addition to the taps and dies includ-

ed in the set, there are two reamers as well as a tap wrench and die stock. The entire set is packed in a convenient case so that all the parts may be kept together and be instantly available when needed.

This new set is described and illustrated in a special folder which also shows a handy emergency repair kit which has also been selected particularly for use with Ford cars. The smith who is doing any auto work will want to keep a copy of this circular among his other "business literature." To obtain your copy address the Wells Brothers Company Division, Greenfield Tap and Die Corporation, Greenfield, Mass., mentioning THE AMERICAN BLACKSMITH.

Forging of Iron and Steel, by William A. Richards, B. S. in M. E. 210 pages, 337 illustrations. Cloth, \$1.50 or 6 shil-

lings and six pence. D. Van Nostrand Co., New York.

This book by Prof. Richards should prove a very valuable addition to the library of books on forging. The author has arranged his chapters and subjects in a logical and sensible way so that the student and reader are carried along through the various operations of forging and smithing practice in logical manner, advancing naturally from the simple operations to the more advanced practices.

The book is thoroughly illustrated and contains chapters on the history of iron and steel, a chapter on the making of iron and steel, and then it goes into the equipment, fuel and fires, and the various operations of smithing. The author also

(Continued on Page 38.)



"F-S" Products satisfy every demand.

Beauty, durability and working qualities are a combination represented in our Coach, Car and Automobile Varnishes and Japans that is not surpassed anywhere. Only the highest-grade materials go into them, and they are made under methods gained by half-a-century's experience.

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QUALITY FIRST!

Use service-guaranteed plow and cultivator shapes and make your repair jobs last. It pays to turn out first class work.

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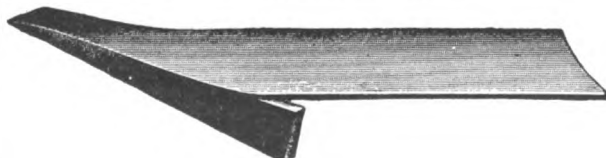
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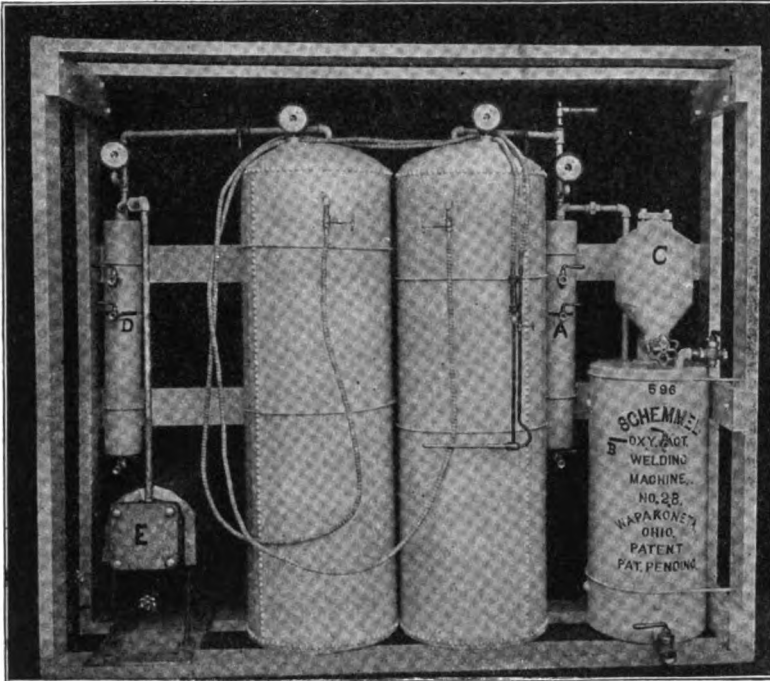
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Schemmel Welding Machine Works

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And remember this point carefully—the Schemmel is a **SOFT** welding machine. Schemmel-made welds remain soft and can be drilled, filed or machined as well after welding as before.

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We also manufacture a **Regulator Outfit**. Write for prices. We do all kinds of welding; send us all the work you can gather up, we allow you a liberal commission. If you have a welding machine send me the work you do not care to do.

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“**FIND OUT**—is the slogan of the successful man in business. If there is a possibility that you can do something that you have to do, with less effort, or to better effect than you are doing it now, **FIND OUT** about it. If anyone has something he says will help you to boost your income or beat a competitor, to cut costs or make more profits—if he offers you **ANYTHING** to make yourself better off than you are now, the shrewd man's plan is to **FIND OUT**.”

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Our claim that this COX Oxy-Acetylene Welding Outfit, selling for only \$75 is absolutely complete, perfect in construction—always efficient in operation and a big money maker for Blacksmiths in all parts of the country is worth investigating.

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Why start with only a welding outfit and then have to buy separate cutting and decarbonizing equipment?

To overlook the cutting and decarbonizing work is to miss half of the big money the oxy-acetylene flame will make for you.

Make the right start. Choose this three-in-one outfit — cutting, welding and decarbonizing. Then you can handle every possible kind of welding work.

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The welding torch furnished with this equipment can be used for cutting steel plate or "I" beams up to $\frac{1}{2}$ inch in thickness by simply inserting the special cutting nozzle. For carbon removing just insert the carbon cleaning nozzle. That's a handy system the busy shop man appreciates. Write AT

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| 1—Beginner's Text Book on Welding. | 10—Copper Asbestos Gaskets. |
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| 1—No. 10 Acetylene Welding Torch. | 1—Nozzle Reamer. |
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| 3—Extra Cutting Tubes. | 10—Steel Welding Rods. |
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| 1—No. 4 Acetylene Regulator, with Gauge. | 3—Toban Bronze Welding Rods. |
| 2—10ft. Lengths of High Pressure Hose. | 1—Pound Cast Iron Flux. |
| 2—Hose Connections. | $\frac{1}{2}$ —Pound Toban Bronze Flux. |
| | $\frac{1}{2}$ —Pound Aluminum Flux. |
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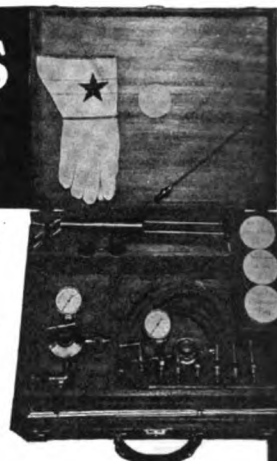
Complete, in case, without Tanks, \$75.00

ONCE for a complete explanation of what you can do with this outfit.

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Also Makers of Acetylene Pressure Welding Generators
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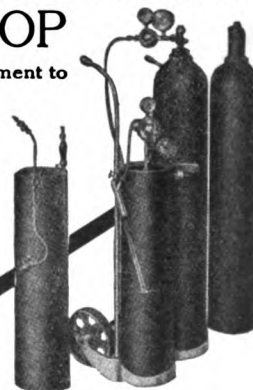
CHOOSE YOUR WELDING PLANT TO FIT YOUR SHOP

Put in this Vulcan Welding Plant if you don't want your welding equipment to take up a lot of room.

Mounted on trucks, you can shove it into an out-of-the-way corner when not in use. And you can easily run the entire outfit to where you are working instead of having to move heavy pieces about the shop. When a job is too big to bring to the shop, throw your Vulcan Welding plant into a carriage or automobile and carry it to the work.

If you are going into oxy-acetylene welding the Vulcan catalog contains facts you will be glad to know. It's free—write now for your copy.

**VULCAN PROCESS CO., BUILDERS OF OXY-ACETYLENE PLANTS
FOR EVERY REQUIREMENT**
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Hundreds of these outfits are in use every day. In most cases the Vulcan Plant pays for itself in the first 30 days. And it is also the economical plant because the Vulcan Torch uses less oxygen yet blends the gases in just the right proportion and projects them from the tip at an exactly correct velocity.

TRADE NOTES AND LITERATURE (Continued from Page 17.)

touches upon the more recent developments in smithing practices, such as electric and autogenous welding. There are also chapters on tool steel, high speed steel, brazing, art iron-work and steam and power hammer operations. An appendix detailing a course of exercises, and tables and a topical index, make the book one that should be in the library of every smith and student of smithing.

Practical Bookkeeping, by James B. Griffith. 288 pages, 140 illustrations. Cloth, \$1.50. American Technical Society, Chicago.

This book begins with the theory of accounting and goes thoroughly into the real reason and basis of bookkeeping. The various points are illustrated with actual forms and figures and thus, what is usual-

ly dry reading, is made interesting and valuable to the business man. Commercial terms are explained, rules are given for bookkeeping, the various methods are explained, the double and single entry systems discussed and demonstrated, account books are explained; in short all parts and divisions of accounting are taken up and carefully explained.

There are chapters on single proprietorship accounts, partnership accounts and wholesale and other accounts. And a complete topical index makes the volume a complete course in bookkeeping for the small and medium sized business.

Business English and Correspondence, by Charles R. Barrett, Ph. B. 216 pages, 27 forms. Cloth, \$1.00. American Technical Society, Chicago.

This book by the publicity editor of the American School of Correspondence is

just the book for the busy business man who has no time for a long-drawn out course in those departments of instruction as will make his business correspondence better from the standpoint of proper language. The author has gone into the subject of business English, construction of sentences and parts of speech just enough to make this second part of the book (on correspondence) clear and easily understood. Here he takes up the subject of letter writing, style and form, illustrating his talks with actual letters and telling how to write letters, to collect accounts, applications for positions; in short, he shows just how all manner of business letters should be written.

Business English and Correspondence is a volume that every smith can add to his library with profit.

(Continued on Page 42.)



CLASSIFIED BUYERS GUIDE (Continued)

	Page.	Stocks and Dies	Page.	Vulcanizers	Page.
Rasps (See Files)		Butterfield & Co.	13	Hill Stage Co.	46
Rubber Tires		Canedy-Otto Mfg. Co.	6	Charles E. Miller	40
Firestone Tire & Rubber Co. ..	13	Champion Blower & Forge Co.	10		
Saws, Band		Greenfield Tap & Die Corp.	15	Welding Compound	
Crescent Machine Co.	11	Hart Mfg. Co.	40	Anti-Borax Compound Co.	44
Silver Mfg. Co.	50	F. E. Wells & Son Co.	7	Bermo Welding Co.	35
Saws, Hack		Wiley & Russel Mfg. Co.	7	Cortland Specialty Co.	52
Millers Falls Co.		Tenonino and Boring Machines		Cortland Welding Compound Co.	48
Schools		Silver Mfg. Co.	50	Weldarine Mfg. Co.	40
Cleveland Auto School	33	Tire Heaters		Welding Outfits	
Cornell Shoeing School	39	West Tire Setter Co.	7	Admiral Welding Machine Co.	41
National Auto School	35	Tire Setters		Cox Brass Mfg. Co.	37
Screw Plates		Brooks Machine Co.	17	Economy Welding Machine Co.	36
Butterfield & Co.	42	Buffalo Forge Co.	8	General Welding Co.	36
Hart Mfg. Co.	40	West Tire Setter Co.	7	Imperial Brass Mfg. Co.	35
F. E. Wells & Son Co.	7	Tire Shrinkers		Metal Hardening Solution Co.	42
Wiley & Russel Mfg. Co.		Buffalo Forge Co.	8	National Welding & Mfg. Co.	
Shaft Couplings		Canedy-Otto Mfg. Co.	6	Rice & Dayton Mfg. Co.	42
C. C. Bradley & Son	16	Champion Blower & Forge Co.	10	Vulcan Process Co.	38
Shaft Ends		Tongs		Metals Welding Co.	38
Crandal, Stone & Co.	52	Atha Tool Co.	13	Schemmel Welding Machine Wks.	37
Shears		Champion Tool Co.	16	Searchlight Co.	36
Bertsch & Co.	40	Tops and Trimmings		Wheels, Wood	
Buffalo Forge Co.	8	A. Wheel, Top & Hardware Co.	4	A. Wheel, Top & Hardware Co.	4
C. D. Edwards	45	Tuyere Irons		Cray Brothers	47
C. Groos	34	Buffalo Forge Co.	8	Wheels, Metal	
Little Giant Punch & Shear Co.	48	Champion Blower & Forge Co.	10	Electric Wheel Co.	43
Simonsen Iron Works	43	Varnishes		Empire Mfg. Co.	45
Spoke Machines		Felton, Sibley & Co.	18	Wood Working Machinery	
Silver Mfg. Co.	50	Vehicle Parts		Buffalo Forge Co.	8
Springs		Cray Brothers	47	Crescent Machine Co.	11
Indianapolis Bolster Springs Co.	15	Veterinary Remedies		Millers Falls Co.	
Harvey Springs Co.	17	Newton Remedy Co.	34	Parts Ball Bearing Machine Co.	33
New Era Spring & Specialty Co.	42	W. F. Young	40	W. L. Sherwood	43
Raymond Mfg. Co.	50	Vises		Sidney Tool Co.	47
Steel		C. & E. Mfg. Co.	14	Silver Mfg. Co.	50
Beals & Co.	42	Columbus Forge & Iron Co.	48	John Whisler	41
Steel Shapes		Millers Falls Co.	45	Wrenches	
Crescent Forge & Shovel Co. ..	46	Prentiss Vise Co.	45	Cray Bros.	47
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If your time is worth 50 cents per hour with your hand plane, it is worth \$4.00 per hour on one of our Jointer Heads. Blacksmiths, Wood Workers, Contractors, Saw Mill Men, etc. This means something to you. We also manufacture Grindstone Shafts to carry stones 4" thick and 36" in diameter and smaller. If you have trouble in taking old machinery apart on account of the bolts turning, read our Nut Splitter circular. Get circulars today. For sale by your Jobber. Manufactured by

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BRIGHT AS THE SUN
Simple as a Candle
A Flood of Shadowless Light
for every purpose. If we are not represented in your town write for particulars in profit-making deal for dealers and agents.
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There is only one car, in all the makes manufactured that is deemed important enough to warrant a special book being written about it. That car is the Ford and Mr. Victor W. Page is the man who wrote the book.

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ITS CONSTRUCTION, OPERATION AND REPAIR

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This is the most complete and practical instruction book ever published on the Ford car. A high grade cloth bound book, printed on good paper, illustrated by special drawings and photographs and describing every nook, corner, pipe, bolt and rivet of the car. It tells all about the operation of the car, driving, repairing and caring for it. How to get the best service out of the car. There are 300, 5 x 7 pages, 100 engravings and two large folding plates. Price \$1.00 or 4/6.

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This chart shows clearly all portions of the Ford motor, the fuel system, the ignition system and the cooling system. It shows you just how to find any trouble and then how to remedy it. It is 25 by 38 inches, on heavy bond paper. Price 25c or 2/6.

This Book and Chart make a Complete Ford Library.
They are indispensable to the Automobile Repairman.

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Ask your dealer for the IMPROVED HELLER RASP with keen cutting hard teeth. Made in all patterns and cuts, "Slim," "Light," "Slim Light," and "Fine Cut." Insist on getting the size, kind and cut best suited for your work. It will pay you to give them a trial. New catalogue mailed free on application.

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We do not claim to be the oldest manufacturers of Screw Plates. We are not sure that this is any distinction.

Our claims for the superiority of our TAPS and SCREW PLATES are based on actual performance. The rapid growth of our business, is proof positive of the excellence of our product.

Be sure you ask for BUTTERFIELDS, and take no substitute.

NEW YORK STORE

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BUTTERFIELD & CO.

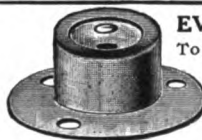
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TRADE **KALUX** MARK

The Best, Cleanest and Cheapest method of hardening and tempering steel tools on the market. Send for particulars. A sample (enough for four gallons of bath) sent postpaid for fifty cents. But one sample sent to the same address.

Metal Hardening Solution Co., Rochester, N. Y., U. S. A.



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It's FREE, and

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BEFORE YOU BUY

That welding outfit make sure of a successful start by looking into the greater value of GEM EQUIPMENT. Write TODAY.

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SEND US YOUR ORDERS

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Beals & Company,

BUFFALO, N. Y.

Blacksmiths' and Wagon Makers' Supplies

IRON STEEL HARDWARE.

LARGEST STOCK IN NEW YORK STATE.

TRADE NOTES AND LITERATURE

(Continued from Page 38.)

The Gasoline Automobile, by Victor Loughheed and Morris Hall, B. S. 320 pages, 300 illustrations. Cloth, \$2.00. American Technical Society, Chicago.

This book discusses the development, construction, operation and the repair of the automobile in a soundly practical

Distributing new complete Auto Supply Catalogue

If interested write on your business stationary

The Campbell Iron Company, Ltd

811 D. Cass Ave. St. Louis, Mo.

Butcher Knives Made for Blacksmiths



Stamped With Your Own Name in \$5.00 Assortments.

We sell by mail only, and to only one smith in each town. Every knife warranted. Write for information and send for catalog. WOODWORTH KNIFE WORKS, Wanda, N. Y.

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Before a display advertisement is accepted for this Journal, inquiry is made concerning the standing of the house signing it. Our readers are our friends and their interests will be protected. As a constant example of our good faith in *The American Blacksmith* advertisers, we will make good to subscribers loss sustained from any who prove to be deliberate swindlers. We must be notified within a month of the transaction giving rise to the complaint. This does not mean that we will concern ourselves with the settlement of petty misunderstandings between subscribers and advertisers, nor will we be responsible for losses of honorable bankrupts, nor can it include advertisements under the head of "Wanted and For Sale."

manner. The authors begin with the automobile itself and take up each part separately, devoting separate chapters to the body, the running gear, the transmission, the motor, until all parts from headlights to tail-lamp have been thoroughly explained.

The second section of the volume takes up the subject of garages and repairs. Here is explained the garage building, the equipment, the tools and the cost of such buildings and equipment. In the chapters on repairs all parts of the automobile mechanism are gone into.

The third section is devoted to driving the automobile and with such parts as are directly concerned with the driving.

Altogether the volume is a most complete treatise on the self-propelled ve-

DON'T WELD BROKEN SPRINGS

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Try New Era BETTER Springs.

Guaranteed even at the bolt hole—NO restrictions. Graphited (for 2 years' lubrication) between all leaves. At better price than auto factories.

Get complete 1915 list of 250 numbers and address of nearest Supply Jobber carrying stock, or wire us for any stock number listed.

Dealers' 30% discount; in lots of ten, 30-15%.

NEW ERA SPRING & SPECIALTY CO.

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Ask for circulars of other low price Ford Specialties.

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The Editor is W. O. Bernhardt, Buffalo, N. Y.; the Business Manager, A. W. Bayard, Buffalo, N. Y. Publisher, The W. F. Wendt Publishing Company, Buffalo, N. Y.

The owners are W. F. Wendt Pub. Co., William F. Wendt, C. H. Schwenk and A. W. Bayard, all of Buffalo, N. Y.

Known bondholders, mortgages and other security holders, holding 1 per cent. or more of total amount of bonds, mortgages or other securities, none.

Signed—A. W. Bayard, Business Manager.

Sworn to and subscribed before me this 17th day of Sept., 1915.

HERBERT S. WHITING,
Notary Public.

hicle, giving the mechanic and repairman an excellent idea of what each and every part really does, how it does it and how it is put together. And this supplemented with the practical matter on garage and its equipment and then the repair of the car, makes the book a valuable one for the practical repairman.

Smiths who desire to build up their carriage trade will find it to their advantage to investigate the line of carriage tires made by the Firestone Tire & Rubber Company.

Firestone Carriage Tires are made in three styles—side wire, cushion and internal wire—and they are described as containing a generous quantity of Firestone rubber to assure extra resiliency, lightness and long wear. Other advantages are said to be that they wear down to the channel and that they will not cut or chip. The Firestone Company is always glad to send complete information about their carriage tires upon request.

Firestone Hoof Pads are another Firestone product in which the Smith will be especially interested just now with Winter shoeing near at hand. "There is no device in shoeing that has anti-slipping merit equalling that of the rubber pad," declares Dr. Joseph Hughes, President of the Chicago Veterinary College. "In heavy hauling, horses having calks on their shoes trample each other while swinging and backing. Shoeing with the rubber pads would lessen, if not entirely avoid, these dangers. During winters, too, rubber pads are the only devices which prevent snow-balling and allow horses to do an average day's work."

Firestone Hoof Pads are made in seven styles for all purposes. Smiths who are not familiar with Firestone pads can obtain a complete description and explanation by addressing the Firestone Tire & Rubber Company, Akron, Ohio, or inquiring at the nearest Firestone branch or dealer.



CURRENT HEAVY HARDWARE PRICES.

The following quotations are the lowest prices generally prevailing October 22, 1915. They are subject to change without notice, and higher prices are charged according to quality, specification and other conditions.

Another advance in steel bars will be noted in the proper column this month.

The prices on all Standard makes of horseshoes have also advanced the price now being on the basis of \$4.25 instead of \$4.00.

Drive Calks prices have been reduced as a price of \$16.00 is now said to be the basis at all jobbing centers.

Business seems to be getting stronger in all lines. The reports of unfavorable conditions become fewer and a tone of very decided cheer is taking the place of gloom which was very apparent several months ago.

The demands made upon us by foreign countries is being felt all along the line—there is a tendency toward more liberal purchasing and altogether the outlook is very bright.

Collections are improving with a prospect of decided betterment.

Horse Shoes—	
All Iron Shoes	\$4.25
Steel Shoes	4.25
No. 0 and No. 1, 25c extra, 15c. per keg additional charged for packing more than one size in a keg.	
Mule Shoes	4.90
X. L. Steel Shoes	5.50
Countersunk Steel Shoes	5.25
Tip Shoes	5.75
Goodenough, heavy	6.00
Goodenough, sharp	6.50
Toe Weight	7.00
Side Weight	9.25
E. E. Light Steel	5.08
Steel Driving	5.50
O. O. Mule Shoes, extra	1.50
Arvils	.11
Merchant Bar Iron—	
\$2.05 rates, full extras, and 20 cents per 100 pounds extra for broken bundles.	
Steel Bars	
\$2.05 rates, full extras	Per Box
Toe Calks—	\$1.25
Blunt	
Sharp	1.50
Screw Calks—	
Blissard M... 5-16 % 7-16 % %	
Sure Grip M. 18.00 18.00 30.00 30.00 22.00	
Bl. Diamond M. 18.00 18.00 30.00 30.00 22.00	
Red Tip M... 20.00 20.00 30.00 30.00 24.00	
Bewe, Jr. M. 18.00 18.00 30.00 30.00 22.00	
R. R. Ft. M. 20.00 20.00 30.00 30.00 24.00	
Plow Lays—	
Solid Cast	\$.08%
Crucible	.09%
Soft Center	.12
Fitted Plow Lays—	
Crucible, 12"	1.20
Crucible, 18"	1.80
Soft Center, 12"	1.85
Soft Center, 18"	2.60
Quick Repair Lays—	
Crucible, 12"	1.30
Crucible, 18"	1.60
Soft Center, 12"	1.70
Soft Center 18"	2.15
Hickory Lumber—Per Foot—	
1 to 2 1/2	\$.10
2 1/2 to 4 1/2	.12
Ash and Oak Lumber—Per Foot—	
1 to 1 1/2	\$.08
1 1/2 to 2	.08 1/2
2 to 3	.10
Yellow Poplar Lumber—Per M. Feet—	
6 to 12	\$75.00
12 to 17	85.00
17 to 24	90.00
24 to 30	95.00
30 to 36	100.00
36 to 42	105.00
42 to 48	110.00
48 to 54	115.00
54 to 60	120.00
Rough Hickory Axles—	
3 x 4 x 6 ft.	\$.75
3 1/2 x 4 1/2 x 6 ft.	1.00
4 x 5 x 6 ft.	1.30
5 x 6 x 6 ft.	2.40
4 x 5 x 6 1/2 ft.	1.75
4 1/2 x 5 1/2 x 7 ft.	2.30
5 x 6 x 7 ft.	2.80
5 x 7 x 7 ft.	3.40
Finished Hickory Axles—	
For 2 1/2 and 3 1/2 Skains	\$.95
For 3 Skains	1.10
For 3 1/2 Skains	1.35
For 4 Skains	1.50
For 5 Skains	1.80
For 6 Skains	2.10

Rough Oak Bolsters—	x 4 x 4 1/2 x 12 x 14 x 16
3 x 4	.36 \$.40 \$1.30 \$1.35 \$1.75
4 x 5	.60 .70 2.20 2.25 3.00
5 x 6	1.00 1.20
Finished Oak Bolsters—	
2 1/2 x 3 1/2 and under	\$.60
3 x 4	.65
3 1/2 x 4 1/2	.80
Rough Oak Wagon Tongues—	
4 x 4 x 2 x 4 x 12 and smaller	\$1.15
Finished Oak Wagon Tongues—	
3 1/2 and smaller	\$1.35
3 1/2	1.45
4	1.55
Two-Inch Sawed Hounds	Per Pair
Tongues	\$.35
Front	.40
Hind	.50
Wheels—	
Sharven Patent—white—not tired	50%
Tiring—No. 13 and less	45%
Tiring—No. 17 and larger	30%
Screws 1 1/2" Thread and less	50%
Rivets 1 1/2" Thread and less	40%
Screws or rivets 1 1/2" and heavier	40%
Boring or Boring less than 10 cent lots	40%
Boring or Boring 10 sets or more of one size	60%
Priming Wheels, net	25c
Oiling, not tired, net	20c
Allowance of 25c per set on all special tired wheels with three or four piece rims.	
Oiling, not tired, No. 17 to No. 39	25c
Oiling No. 45 and larger	40c
Special Wheels Tired—"E"	Grade. 2 piece Rim.
0 3/4 x 1 1/2"	\$6.95 9 1 1/2 x 1 1/2" \$ 9.85
1 3/4 x 1 1/2"	7.20 9 1 1/2 x 1 1/2" 9.80
3 1 1/4 x 1 1/2"	7.65 13 1 1/4 x 1 1/2" 12.00
3 1 1/2 x 1 1/2"	7.90 13 1 1/2 x 1 1/2" 12.40
Cupped Oak Hubs.	Plain End Oak Hubs.
7 x 8 x 9	\$1.15 10 x 14
7 x 9 x 10	1.25 11 x 14
8 x 9 x 10	1.25 11 x 15
8 x 10 x 11	1.50 11 x 16
9 x 10 x 11	1.69 12 x 16
9 x 11 x 12	1.80 12 x 17
10 x 12 x 13	2.75 13 x 18
11 x 13 x 14	3.90
12 x 14 x 15	4.50
Rough Sawed Felices—	
1 1/2 x 2"	\$1.70 3 x 2 1/2"
1 1/2 x 2 1/2"	1.90 3 1/2 x 2"
1 1/2 x 3"	2.00 3 x 3"
3 x 3 1/2"	\$5.75
Ironed Poles, White, XXX—	
2 x 2 1/2" No. 2	\$3.80
2 x 2 1/2" No. 3	3.80
Ironed Shaft, White, XXX—	
1 1/2 x 2" and smaller	\$1.95
1 1/2 x 2"	2.30
1 1/2 x 2 1/2"	2.70
Farm Wagon Bows—	
Round Top, 1/2 x 2"	\$.60
Flat Top, 1/2 x 2"	.75
Round Top, 3/4 x 2 1/4"	1.35
Standard Size Piano Bodies with Seats—	
Each	\$4.25
Plow Beams—	
1 Horse	\$.60
2 Horse	.75
3 Horse	1.10
Spokes and Rims—	
Oak and Hickory Spokes, net on Wels & Lash List No. 6.	
Finished Rims—XX—7/8"	\$1.59
Finished Rims—XX—1"	1.65
Oak Rims—Discounts	40-10%
Hickory Rims	40%
Wagon Neckpoke Woods—	
Keller & Tamm's List—Discount	25%
Wagon Whiffletree Woods—All Grades—	
Keller & Tamm's List Discounts	25%
Oval Plow Doubletrees—	Flat Plow Doubletrees—
2 x 38"	\$1.60 1 1/2 x 3 1/2 x 42"
2 x 40"	2.40 \$2.75
Wagon Evener Woods—	
2 x 4 and 2 x 4 1/2—Keller & Tamm's List—Discount	30%
Larger	25%
Buggy Evener Woods—All Grades	
Keller & Tamm's List—Discount	25%
Buggy Whiffletree Woods—	
Mixed Second Growth and Second Growth—Keller & Tamm's List—Discount	30%
Buggy Neckpoke Woods—All Grades	
Keller & Tamm's List—Discount	20%

ENGINE PRICES LOWER

200,000 customers testify to quality of Galloway-built goods. Our engines made in our factories. Modern design. Built for long, hard, continuous users' satisfaction. Don't buy until you investigate these heavy-weight, long stroke, large bore, low speeded, heavy-duty engines. Engines book free. Wm. Galloway Co., Box 195, Waterloo, Iowa.

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17 95
1 1/2 H.P.

SIMONSEN

Hot Trimming Shear

Handiest Tool For Cutting Hot Iron And Plow Steel About The Forge. Ask any jobber or write us for circulars showing this, and our all wrought shears for cold shearing.

SIMONSEN IRON WORKS
Box 671 Sioux Rapids, Ia., U.S.A.

WE MAKE STEEL WHEELS TO FIT ANY AXLE PLAIN OR GROOVED TIRE

STEEL OR HICKORY AXLES ANY SIZE

OUR GROOVED TIRE A FULL LINE OF WOOD and STEEL FARM TRUCKS With Steel or Wood Wheels

WRITE FOR LARGE CATALOG and PRICES

ELECTRIC WHEEL CO., Box A, Quincy, Ill.

WAGON MAKERS' SPECIAL No. 88

This is one of our Safety First woodworking machines. It will get out the greatest part of the wood work used in a wagon by MACHINERY, FAST, NEAT and at a LOW cost.

Get acquainted with this line of machinery.

W. L. SHERWOOD, Kirksville, Mo., U. S. A.

Best Gasoline Brazing Forge

IN THE WORLD

Thousands sold in last ten years. Four sizes. Send for Catalog.

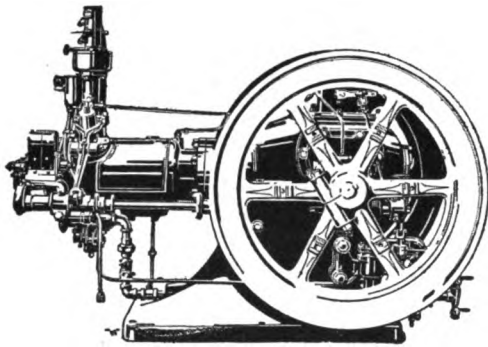
The National Cement and Rubber Co.
308 S. St. Clair Street Toledo, Ohio, U. S. A.

"NEW EASY" 4 Sizes BOLT CLIPPERS "EASY" 2 Sizes

THE GENUINE TOOL

H. K. PORTER EVERETT, MASS. U. S. A.

KNOWN AND PREFERRED EVERYWHERE



BUY RELIABLE POWER

People who are familiar with the construction and the reliable operation of International Harvester engines, Titan or Mogul, often grow enthusiastic and declare that you would have to take all the good points on all other engines and combine them, in order to get the equal of the engine with the I H C mark. Strictly speaking, they are wrong. Such a composite would still not equal any engine in the I H C lines for it could not include the famous individual features that you find on no other engine made.

International Harvester Engines

long ago outstripped every other brand or make or manufacture, in sales and in popularity.

Whatever your use for engine power, you cannot afford not to consider International Harvester oil engines, Titan or Mogul. Made in all styles—built for all power purposes—in sizes from 1 to 50 H. P. They run on the cheapest or most convenient fuel.

Ask us to do these two things—send you an interesting catalogue showing the I H C engine features, and tell you the name of the nearest I H C dealer.

International Harvester Company of America
(INCORPORATED)

13 Harvester Building Chicago U S A

CRESCENT
WELDING
COMPOUND
TRADE MARK

TWO BIG HELPS
IN WELDING
DON'T BE WITHOUT THEM



"E-Z" Welding Compound

is the best BECAUSE it works equally good on all kinds of steel. It welds at lower heat than any other. It sticks to metal at a very low heat. It leaves no scale. Use it once and you will always want it.

Crescent Welding Compound

makes smoother welds than any other. It is fine for plow work or where parts are fastened together before welding, or for making split welds, finishing heats, or for welding under dies, etc., etc. It insures smooth finish and perfect welds on Toe Calks.

"Money back" from any jobber if "E-Z" or Crescent does not give perfect results.

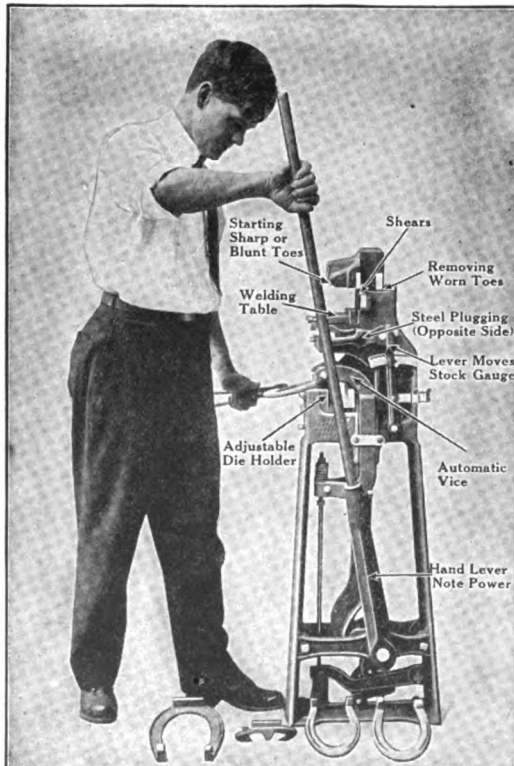
We Will Send Samples Free.

Made only by

Anti-Borax Compound Co.

FORT WAYNE, IND.

The Greatest LABOR SAVING Machine on Earth



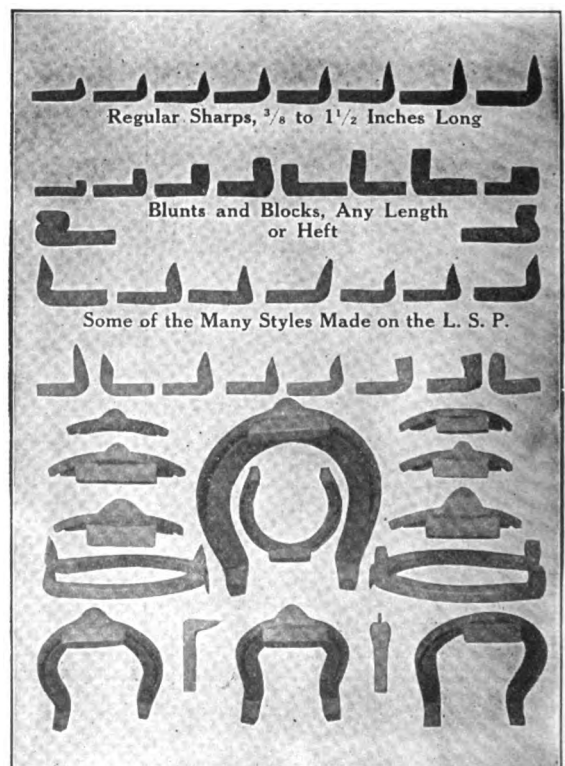
1916 MODEL—AN ENTIRELY NEW MACHINE.
Fully covered with Patents.

THE L. S. P. CALKING MACHINE

Our 1916 MODEL is far superior in every way to our former styles, doing a much larger range of work and a more finished job, much handier and easier to operate.

It is a strong, handsome, well-made machine, weighing 60 pounds more than our former style, but only takes up 8 x 15 inches floor space. No foot Treadle to bother, both feet on the floor. Automatic Vise which holds the shoe rigid. It does all kinds of Sharp, Blunt and Block Heeling. Starts the Toe Calks without use of hammer, removes the worn toes, welds Sharp and Blunt Toes, does Steel Plugging, rolls out a perfect, finished Clip. Work better than done by hand, with ease and in a fraction of the time. The Greatest Time and Labor Saving and Money Making Machine that ever went into a Shoeing Shop.

Write at once for full description and prices.

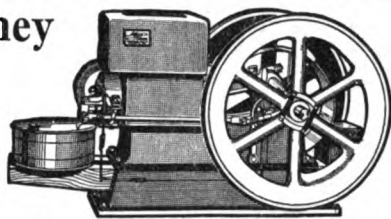


The above is an actual photograph of some of the work, just as it came from the machine without a hammer touching it.

L. S. P. CALKING MACHINE COMPANY WYALUSING, PA., U. S. A.
NATIONAL MACHINE CO., BRIGHTON, ONT., CANADA



Make Money Selling This Engine



Carpenters and Shop Men, Blacksmiths and Garage Men

Here is your chance to handle a high grade engine at prices that will get the engine business of your locality. One engine will sell another. Our liberal discounts from prices here quoted makes you a good profit. Complete line as per list below.

Keco ENGINES

Gasoline, Kerosene & Gas

RETAIL PRICES

Stationary Engines

2 H.-P.,	\$ 35.10
3 H.-P.,	52.65
4 H.-P.,	70.20
6 H.-P.,	100.00
8 H.-P.,	140.40
12 H.-P.,	210.90

Portable Engines

2 H.-P.,	\$ 40.15
3 H.-P.,	60.75
4 H.-P.,	83.35
6 H.-P.,	130.00
8 H.-P.,	176.80
12 H.-P.,	248.00

Engine Saw-Rigs

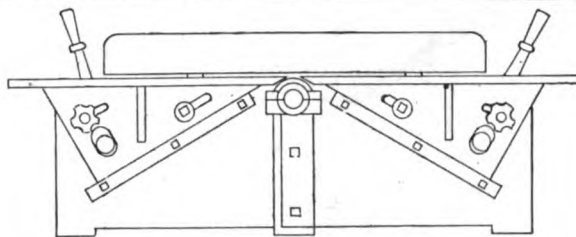
4 H.-P.,	\$128.25
6 H.-P.,	155.90
8 H.-P.,	205.00
12 H.-P.,	272.50

(F. O. E. Factory)
**FIVE YEARS
GUARANTY**

are absolutely high grade, made in an independent factory. Engines are center-firing, valve-in-head type, with automobile ignition. Safety spark shift for easy and safe starting. Best of materials and construction—simple to operate durable—give even speed and low cost power with low repair cost.

SOLD ON TRIAL—Every engine is fully guaranteed for five years. Write for our independent dealers' proposition, and our **NO RISK DEALERS' OFFER**. Let us show you the profit you can make with our independent line of engine. Don't wait if you want exclusive sale, but write today.

Manufacturers Engine Company,
1639 Crystal Ave.,
Kansas City, Missouri.



A 5' Hand Planer or Bench Jointer for \$25.00

The tables have quick easy Adjustments, Adjustable fence cast-iron construction, Hooker to your engine, and get out any of timbers used in a common wagon. Especially adopted to small shops and light power. Write for further information on the above and larger Complete Jointers. We make a full line of Cutter Heads as for wood tables, square, circular, or slotted.

W. L. SHERWOOD,

Kirkville, Mo., U. S. A.

More Money for Shop Owners

You want more profits. Other shop owners have installed Famous Woodworkers and are making big money with them. **YOU CAN DO THE SAME.**

Many attachments can be used on **FAMOUS WOODWORKERS**, such as the Tongue and Pole Rounder, Spoke-Tenoner, Rim Borer and Wheel Equalizer.

REASONABLE PRICES FROM

\$125 to \$500

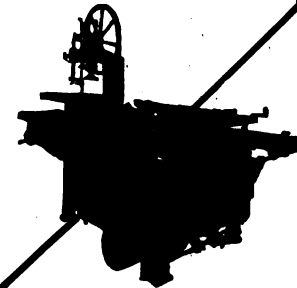
Depending on Size and Equipment.

Write Today for Circular

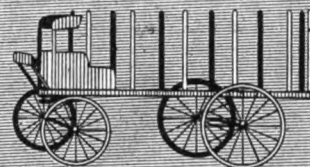
Giving full description. Liberal terms of payment arranged if desired.

SIDNEY TOOL CO.,

Dept. 14,
Sidney, Ohio, U. S. A.



CRESCENT



Turn Idle Time into Extra Dollars

Use your spare moments this winter to make a few of the wagons, carts or other parts here shown and you will be surprised how much additional profits you will have by spring.

All you need is this **CRESCENT UNIVERSAL WOODWORK**—a light but compact, complete and handy woodworker made especially for blacksmiths and carriage men.

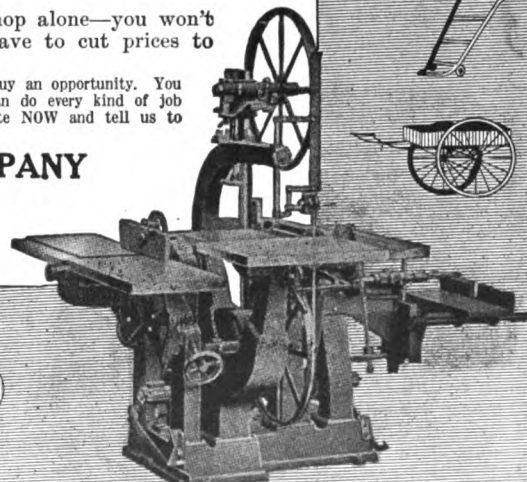
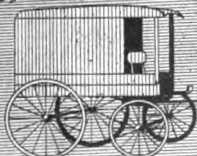
Then you won't have to depend upon the forge shop alone—you won't have to worry about slack times—and you won't have to cut prices to hold your trade.

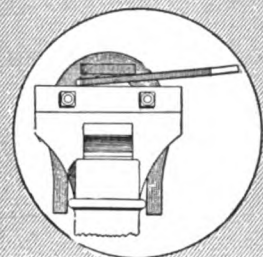
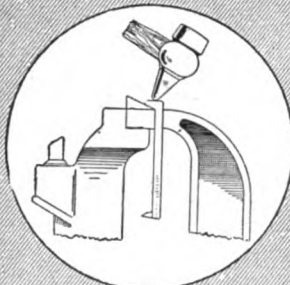
When you buy this woodworker you buy more than a machine—you buy an opportunity. You have the chance to command all the wood repair work because you can do every kind of job both rightly and quickly. This is the time to act—don't delay—write NOW and tell us to send the facts.

THE CRESCENT MACHINE COMPANY

245 Main Street, LEETONIA, OHIO

The Crescent Catalog is one of those business books the wideawake smith likes to keep handy—write now for your copy.





THE IMPROVED FULLER FOOT VISE

Once a user—always a user. The only self-locking automatic adjusting foot vise on the market. Made of materials and workmanship that guarantees the machine for life.

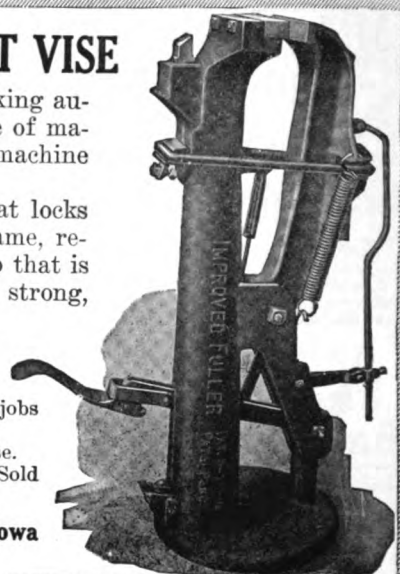
Not an ordinary foot vise, but a foot vise that locks instantly with light, even pressure always the same, regardless of the thickness of stock and with a grip that is equalled only by a heavy screw vise. Simple, strong, durable and backed by a life guarantee.

For sharpening heel and toe calks, pulling off old toes, hot rasping, steel plugging, turning ordinary mud calks, knocking out sickle sections, upsetting thin iron bending angles, traveling tires and a hundred other odd jobs about the shop.

The price is but little more than the ordinary foot vise.

Send for our attractive circular describing this vise. Sold by all dealers. Act today.

C. & E. Manufacturing Company, Marshalltown, Iowa



Don't do without an engine Now!

It is cheaper now to have a WITTE engine than to do without. Easy to start, without cranking; easy to manage; and easy to own on any suitable, reasonable terms of payment during a year.

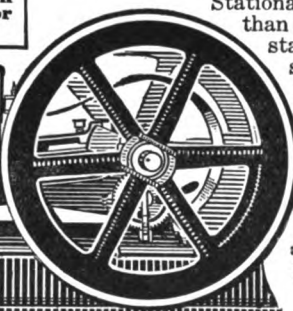
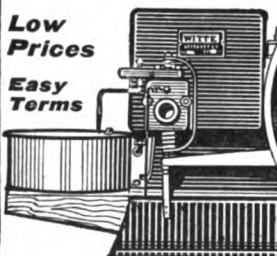
Fuel-Saving

WITTE ENGINES

Gasoline, Kerosene, Distillate and Gas

Let me send you an engine to earn its own cost, while you pay for it.
Ed. H. Witte.

Low
Prices
Easy
Terms



Stationary engines for prices averaging less than \$17.50 per horse-power. Eight sizes, stationary and portables, four sizes saw-rig outfits. Guaranteed high quality—through and through—as durable as superior design, the best of materials and workmanship can make. Get my engine facts before decide to get any engine.

Book Free: My book, "How to Judge Engines," will show you how to save and make money in getting and using an engine. Write for it today, addressing nearest office.
ED. H. WITTE, Witte Engine Works,
1 64 Oakland Ave., Kansas City, Missouri.
1764 Empire Bldg., - Pittsburgh, Penna.

Look at These New Prices!

(F. O. B. Factory)

SIZE H-P	STATIONARY ENGINES	PORTABLE ENGINES
2	\$ 34.95	\$ 39.95
3	52.45	60.50
4	69.75	82.75
6	97.75	127.75
8	139.65	174.65
12	197.00	237.00
16	279.70	329.70
22	359.80	412.30

Engine Saw-rigs Complete.
4 H-P, \$124.25; 6 H-P, \$152.25
8 H-P, 202.15; 12 H-P, 267.00

5-Year Guarantee

Cash or Easy Terms



Just to remind you of

The Searchlight Co.

makers of the Searchlight Oxy-Acetylene Welding and Cutting Apparatus and of Searchlight Gas—the pure, dry, compressed acetylene. Complete literature upon request.

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Ask Subscribers Service. Do you need Help—Books—Magazines—Printing—Stationery or anything else in connection with your business or trade?

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BUFFALO, N. Y., U. S. A.

TRADE LITERATURE AND NOTES

A Christmas Present of one hundred pounds of Webster Selected Smithing Coal is offered to every reader of "Our Journal" in the Pennsylvania Coal & Coke Corporation's advertisement in this issue. It is a genuinely free gift, there are no strings tied to it, and all one has to do to receive the free coal is to fill out the convenient coupon contained in the ad.

The coal will be put up in a strong sack and shipped direct to you so that you may give it a trial in your own forge. This is a real practical way of expressing the season's greetings and it is a gift

which will be appreciated by every shop owner. To be sure that the coal reaches you by Christmas the coupon should be filled out as soon as this issue is in your hands.

When you receive this gift you will be in a position to form your own opinion of Webster Selected Smithing Coal—the coal which has been endorsed so unreservedly by James Cran, J. F. Sallows and Dayton O. Shaw. To receive your bag just cut the coupon out of the advertisement and send it to the Pennsylvania Coal & Coke Corporation, Whitehall Building, New York City.

The Smith Who Wonders just what he could do if he had an oxy-acetylene welding equipment will be interested in the illustration appearing in the advertisement of the Cox Brass Manufacturing Company in this issue. A photograph of a badly broken crank case is shown both before and after welding. It is work of this kind, which the Smith can do as well as any other mechanic, that is adding extra profits to the shop owner with a welding plant this season.

Our readers can obtain some exceedingly useful information from a special circular
(Continued on page 42)



CLASSIFIED BUYERS GUIDE (Continued)

	Page.	Steel	Page.	Veterinary Remedies	Page.
Rasps (See Files)					
Rubber Tires		Beals & Co.		Newton Remedy Co.	36
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Crescent Machine Co.	11	Star Manufacturing Co.	16	C. & E. Mfg. Company	12
Silver Mfg. Co.	50	Stocks and Dies		Columbus Forge & Iron Co.	48
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Millers Falls Co.	35	Canedy-Otto Mfg. Co.	6	Prentiss Vise Co.	45
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Chicago Patented Tools Co.	40	Champion Blower & Forge Co.	10	Searchlight Co.	12
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Little Giant Punch & Shear Co.	47	Atha Tool Co.	13	A. Wheel, Top & Hardware Co.	4
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Silver Mfg. Co.	50	A. Wheel, Top & Hardware Co.	4	Electric Wheel Co.	43
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Harvey Springs Co.	15	Champion Blower & Forge Co.	10	Buffalo Forge Company	8
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				Cray Bros.	47
				George A. Cutter	42
				Stanley Rule & Level Co.	40

The Wood Worker's Friend



If your time is worth 50 cents per hour with your hand plane, it is worth \$4.00 per hour on one of our Jointer Heads. Blacksmiths, Wood Workers, Contractors, Saw Mill Men, etc. This means something to you. We also manufacture Grindstone Shafts to carry stones 4" thick and 36" in diameter and smaller. If you have trouble in taking old machinery apart on account of the bolts turning, read our Nut Splitter circular. Get circulars today. For sale by your Jobber. Manufactured by

JOHN WHISLER,

Gibson, Ia.

JOB WELDING
WELDING APPARATUS
WELDING SUPPLIES

ADMIRAL WELDING EQUIPMENT

Handles all work from lightest to heaviest, most economically. Full line of Welding Rods, Fluxes, Decarbonizer and Instruction Book included.

YOU CAN'T BUY A BETTER
OUTFIT AT ANY PRICE

We Conduct the Largest Welding Shop in the West and Use this Outfit Exclusively. Personal Instructions Free. Write for Booklet.

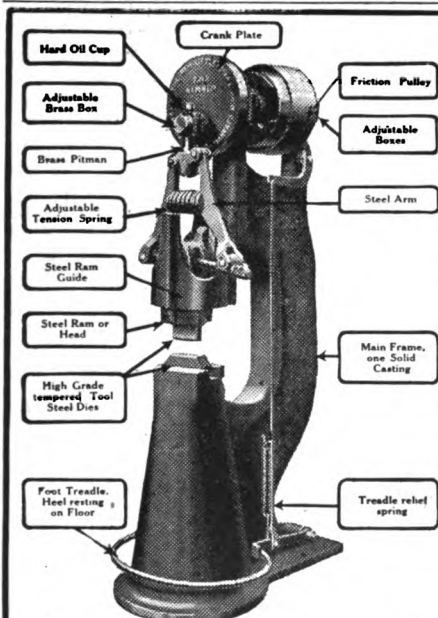
Admiral Welding Machine Company
1330 Walnut Street, Kansas City, Mo.



KEROSENE Gas Lamps

AN IDEAL LIGHT for
BLACKSMITHS and WAGON SHOPS
and every purpose. Kerosene
or Gasoline. Write for par-
ticulars. AGENTS WANTED.
BRILLIANT GAS LAMP COMPANY
1009 F. So. Wabash Ave.,
CHICAGO, ILL.



Little
Giant
Power
Hammer

With or Without
Individual Motor
Drive.
400 R. P. M.
Machine Gun Rapidity
and Precision

A
Decidedly
Dependable
Drudgery
Destroying
Device

Every LITTLE GIANT POWER HAMMER made is still in use, including the first one manufactured more than twenty-five years ago.

Their 1914 upkeep expense, all sizes and ages, averaged 48 cents each, or less than 2/5 of 1% of original cost to user. There is no wear-out to them. More sold than all others combined.

They save elbow grease and do better work than is possible by hand, paying for themselves every few months. Sold on 30 days' trial. Easy terms, if desired. Write your jobber, or direct to us.

MAYER BROTHERS COMPANY

101 Rock Street, MANKATO, MINN., U. S. A.

Three Outfits in One
Cutting
Welding
Decarbonizing

Not a toy, but a low priced, high quality welding plant—the only one furnishing a combination welding and cutting torch.

Inserting the cutting nozzle converts it into a cutting torch that will cut steel plate or "I" beams up to 1/2 inch in thickness at the rate of 12 inches in 50 seconds. Also cuts heavier metals up to 3 inches.

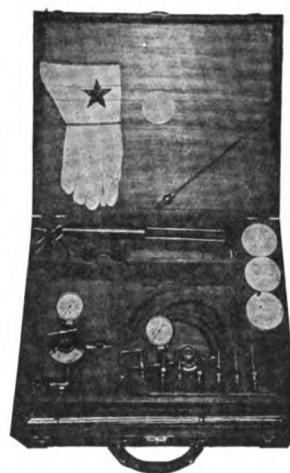
Blacksmiths find it the economical but efficient equipment for successfully welding cast iron, steel, copper, brass, aluminum, bronze, and malleable iron. An even pressure of both the oxygen and the acetylene is maintained by our high pressure Metal Diaphragm Regulators. Carbon from automobile or gas engines can be quickly removed by using the carbon cleaning nozzle.

We also are manufacturers of acetylene pressure welding generators approved by the Underwriters' Laboratories.

Write today for complete information about this portable outfit that will soon pay for itself and earn a substantial income for its owner.

No. 2 Portable Welding Equipment Includes

- 1—Beginner's Text Book on Welding.
- 1—Carbon Cleaning Nozzle.
- 1—No. 10 Acetylene Welding Torch.
- 6—No. 10 Welding Nozzles, No. 1 to No. 6.
- 1—No. 10 Cutting Tubes.
- 3—Extra Cutting Tubes.
- 1—Oxygen Regulator with Gauge.
- 1—No. 4 Acetylene Regulator, with Gauge.
- 2—10 ft. Lengths of High Pressure Hose.
- 2—Hose Connections.
- 10—Copper Asbestos Gaskets.



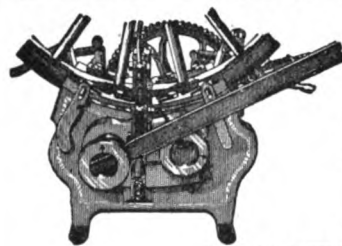
- 1—Torch Wrench.
- 1—Nozzle Reamer.
- 1—Pair Welding Glasses.
- 6—Cast Iron Welding Rods.
- 10—Steel Welding Rods.
- 3—Aluminum Welding Rods.
- 3—Toban Bronze Welding Rods.
- 1—Pound Cast Iron Flux.
- 1—Pound Toban Bronze Flux.
- 1—Pound Aluminum Flux.
- 1—Pair Welding Gloves.

Complete, in case, without tanks, \$75.00

The Metals Welding Company CLEVELAND, OHIO



The Brooks Machine Company



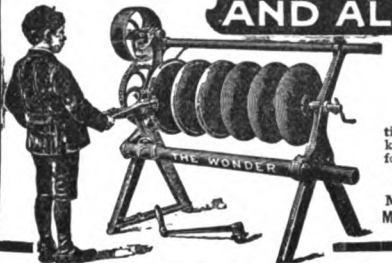
Manufacturers of Oxy-Acetylene Welding machines, Acetylene Generators, Welding outfits to be used with compressed cylinder gas, and the Brooks Hydraulic Cold Tire Setters, the Brooks Lever Cold Tire Setters, which are endorsed and in use in the shops of the U. S. Government.

Nothing better made than a Brooks. Get our printed matter before buying. Write us today.

WICHITA, KANSAS, U. S. A.

WONDER DISC SHARPENERS

SAVE 1/2 THE TIME
AND ALL THE LABOR



THE WONDER is the only machine adjusted to all conditions.
Can shear any part of edge to any bevel.
Can shear back from edge as far as required.
Can use tool on either side of disc.
Can shift from one disc to another.
Can do all this without the turn of a set screw or nut, is a positive feed, automatically adjusts itself to wobbling or bent discs; knives made of best grade selftempered steel; will last a lifetime; for hand and power. For prices, write to your jobber or

A. E. DURNER, Manufacturer
Main Office: Evansville, Wisconsin, U. S. A.
Made in Evansville, Wis., and Brandon, Man., Canada

"Bay State" Carriage and Tire Bolt Ratchet Wrenches

Labor
Savers!
Money
Savers!



Three Sizes
Take Hex and
Square Nuts

GEO. A. CUTTER, Sales Agent, Taunton, Mass.

Ask Your Dealer

TRADE NOTES AND LITERATURE

(Continued from Page 12.)

"The Facts", which has recently been issued by the Cox Brass Company. It will be sent to every reader of THE AMERICAN BLACKSMITH who writes for a copy. The letter should be addressed to the Cox Brass Manufacturing Company, Dept. 45-D, Albany, N. Y. The ad in this issue contains a special coupon which may be used if desired.

The Parry Manufacturing Company, of Indianapolis, Indiana, was one of the first manufacturers to see the profitable possibilities in trailers, commercial bodies, one-man tops, closed-in winter tops, etc., as products of their immense factory which has been devoted for over a third of a century to the production of horse-drawn vehicles exclusively.

The close similarity between the equipment and workmen necessary to produce these parts for automobiles and that which constituted the equipment of the Parry Company for producing similar parts on horse-drawn vehicles was so apparent that the short step to the added lines was very natural. It was taken without interfering in anyway with the manufacture of the popular Parry horse-drawn vehicles, which the company states will be the main product of their plant so long as there are horses.

As a result the company has been experimenting on various specialty features. They now have the models fully worked out and are ready to supply the trade with some eight or ten accessory features that make it worth any reader's time to investigate their proposition.

The chief activities of the company in the line of commercial bodies has been

directed toward designs for the Ford chassis, although the facilities of the plant are such that the Company contemplates going after large contracts for commercial bodies to be used on other cars as well.

The trailers that the company is building comprise two models, a "Two-wheeler" and a "Four-wheeler". One prominent feature of the Parry trailers is the manner in which the connection is made. The "hitch" is a convenient adaptation of the Bradley Couplers and permits of a straight-pull on both ends of the axle that adapts itself to the motion of the rear axle of the car to which the trailer is attached.

The construction of the four-wheeled Parry trailer is of a simple and effective type. Perfect tracking is secured without the complicated mechanism that has generally been used.

Complete information will be gladly sent to all interested readers who will write to the Parry Mfg., Company, Indianapolis, Ind. THE AMERICAN BLACKSMITH should be mentioned in the letter.

The Nicholson File Company, of Providence, Rhode Island, one of the most important factors in the Smithing field, and a recognized leader in its line of activity, has become a member of the Rice Leaders of the World Association.

This important step taken by this half-century old organization is in line with the advanced ideas of its officials. Acceptance of the invitation to affiliate with some of the most powerful and best known business concerns in the country, therefore, brings the Nicholson File Company into still greater prominence.

Members of the Rice Leaders of the

World Association have been invited to affiliate because of their known principles of commercial integrity their honorable activities and their unshakable and commendable adherence to the precepts of the Golden Rule. Honor, quality, strength and service are the principles upon which business has been, and must be, conducted to make any concern eligible for membership.

How closely the Nicholson File Company measures up to these qualifications is well known, and the judgment of the Association's invitation committee is regarded as expertly exercised. In measuring up to those standards the concern reflects credit upon itself and stands out as a shining example of clean business activity.

It will be a matter of considerable interest and satisfaction to the many friends and employes of the Nicholson File Company to know that the firm has been elected to membership. Apart from the sterling principles that ever have governed the conduct of the official family of the company during its long history, the great trade and influence enjoyed marked the institution for the unusual distinction it now has gained.

The Nicholson File Company was incorporated in Rhode Island in 1861, to manufacture files and rasps. Its main plant and offices are located at Providence. Additional factories are maintained at Paterson, New Jersey, Anderson, Indiana and Port Hope, Ontario, Canada.

William Thomas Nicholson was the founder of the company. His natural love for mechanics was put to practical use, and it was while operating a small machine shop on his own account that he built his first file-cutting machine. The success that has attended the results of his efforts came only after hard, earnest and patient study. Although other concerns lost considerable in their efforts to manufacture files, Mr. Nicholson had faith in his products and constantly kept them before the public. The superior merits of Nicholson Files were quickly manifest, and the business grew steadily.

This company manufactures at its Providence factory alone more than 3,500 different kinds of standard files. Files for every conceivable usage are made. They range from the extra-fine accessories of the jeweler to the heavy rasps used by Blacksmiths, with a long list of other kinds for machinists and mechanics.

The Rice Leaders of the World Association, of which Elwood E. Rice is founder and president, represents many lines of industry. It avows its unalterable faith in sound business principles, and its well-known emblem symbolizes a cohesive effort to standardize the tenets of honor, quality, strength and service.

The Working Parts of a power hammer are made quite plain by the unusual illustration which is being used in the advertisements of the Little Giant Power Hammer. If you will note the ad in this issue you will see that each part is accurately pointed out by arrows and that you can gain a better idea of the hammer in this way than by reading pages of description.

The Smith who is yet to use a power hammer can obtain some exceedingly valuable information from the makers of the Little Giant. Just write to the Mayer Brothers Company, 101 Rock Street, Mankato, Minn., and mention THE AMERICAN BLACKSMITH in your letter.

Changing Spare Time into bigger profits is one of the problems the progressive

(Continued on Page 45.)

CURRENT HEAVY HARDWARE PRICES.

The following quotations are the lowest prices generally prevailing November 17, 1915. They are subject to change without notice, and higher prices are charged according to quality, specification and other conditions. Another advance in steel bars—from \$2.05 to \$2.15 will be noted this month.

An advance on anvils was also recently announced by the manufacturers, though no actual advance will be made by some jobbers until the first of the year.

All iron and steel items in the heavy hardware lines continue to advance. Prices are firm and further advances are expected.

Dealers and jobbers are adding auto accessories to their lines and are reporting good business in these items.

Business generally continues to improve and collections are reported unusually good.

Horse Shoes—

All Iron Shoes	\$4.25
Steel Shoes	4.25
No. 0 and No. 1, 25c extra. 15c. per keg additional charged for packing more than one size in a keg.	
Mule Shoes	4.90
X. L. Steel Shoes	5.50
Countersunk Steel Shoes	5.25
Tip Shoes	5.75
Goodenough, heavy	6.00
Goodenough, sharp	6.50
Toe Weight	7.00
Side Weight	9.25
E. E. Light Steel	5.00
Steel Driving	5.50
O. O. Mule Shoes, extra	1.50

Anvils11

Merchant Bar Iron—

\$2.15 rates, full extras, and 20 cents per 100 pounds extra for broken bundles.

Steel Bars—

\$2.15 rates, full extras

Toe Calks—

Blunt	\$1.25
Sharp	1.50

Screw Calks—

	5-16	3/4	7-16	1/2	5/8
Blizzard M.	\$18.00	\$18.00	\$20.00	\$20.00	\$22.00
Sure Grip M.	18.00	18.00	20.00	22.00	23.00
Bl. Diamond M.	18.00	18.00	20.00	22.00	22.00
Red Tip M.	20.00	20.00	22.00	22.00	24.00
Rowe, Jr. M.	18.00	18.00	20.00	20.00	22.00
R. Rg. Pt. M.	20.00	20.00	22.00	22.00	24.00

Plow Lays—

Solid Cast	\$.08%
Crucible	.09%
Soft Center	.13

Fitted Plow Lays—

Crucible, 12"	\$1.20
Crucible, 18"	1.80
Softer Center, 12"	1.95
Soft Center, 18"	2.60

Hickory Lumber—Per Foot—

1 to 2 1/2	\$.10
2 1/2 to 4 1/2	.12

Ash and Oak Lumber—Per Foot—

1 to 1 1/2	\$.08
1 1/2 to 2	.08 1/2
2 to 2 1/2	.09
2 1/2 to 3	.10

Yellow Popular Lumber—Per M. Feet—

6 to 12	13 to 17	18 to 24
3/4"	\$75.00	\$85.00
1"	78.00	90.00
1 1/4"	85.00	95.00
1 1/2"	85.00	114.00
1 3/4"	85.00	114.00

Rough Hickory Axles—

3 x 4	6 ft.	\$.75
3 1/2 x 4 1/2	6 ft.	1.00
4 x 5	6 ft.	1.30
5 x 6	6 ft.	2.40
4 x 5	8 1/2 ft.	1.75
4 1/2 x 5 1/2	7 ft.	2.30
5 x 6	7 ft.	2.80
5 x 7	7 ft.	3.40

Finished Hickory Axles—

For 2 1/2 and 2 3/4 Skeins	\$.95
For 3 Skeins	1.10
For 3 1/2 Skeins	1.35
For 3 3/4 Skeins	1.50
For 3 1/2 Skeins	1.80
For 4 Skeins	2.10

Rough Oak Bolsters—

3 x 4	4 x 4 1/2	12 x 14	16 x 16
	\$.38	\$.40	\$1.30
4 x 5	.60	.70	2.20
5 x 6	1.00	1.20	2.25

Finished Oak Bolsters—

2 3/4 x 3 3/4 and under	\$.60
3 x 4	.65
3 3/4 x 4 1/2	.80

Rough Oak Wagon Tongues—

4 x 4 2 x 4 x 12 and smaller	\$1.15
------------------------------	--------

Finished Oak Wagon Tongues—

3 1/2 and smaller	\$1.35
3 3/4	1.45
4	1.55

Two-Inch Sawed Hounds

Tongues	Per Pair
Front	\$.35
Hind	.40

Wheels—

Sarven Patent—white—not tired	50%
Tiring—No. 13 and less	45%
Tiring—No. 17 and larger	30%
Screws 1 1/4" Thread and less	50%
Rivets 1 1/4" Thread and less	40%
Screws or rivets 1 1/2" and heavier	40%
Boring or Boxing less than 10 cent lots	40%
Boring or Boxing 10 sets or more of one size	60%
Priming Wheels, net	25c
Oiling, not tired, set	20c
Allowance of 25c per set on all special tired wheels with three or four piece rims.	
Oiling, not tired, No. 17 to No. 39	25c
Oiling No. 45 and larger	40c

Special Wheel Tired—"E"

0 3/4 x 1 1/4"	\$6.95	Grade 2 piece Rim.	\$ 9.35
1 1/4 x 1 1/4"	7.20	9 1 1/4 x 5-16"	9.80
3 1 x 1 1/4"	7.65	13 1 1/4 x 5-16"	12.00
3 1 x 5-16"	7.90	18 1 1/4 x 5/8"	12.40

Cupped Oak Hubs.

10 x 14	\$8.30	7 x 8 x 9	\$1.15
11 x 14	4.20	7 x 9 x 10	1.25
11 x 15	4.50	8 x 9 x 10	1.25
11 x 16	5.10	8 x 10 x 11	1.50
12 x 16	5.75	9 x 10 x 11	1.69
12 x 17	6.30	9 x 11 x 12	1.80
13 x 18	7.00	10 x 12 x 13	2.75
		11 x 13 x 14	3.90
		12 x 14 x 15	4.50

Rough Sawed Fellows—

1 1/2 x 2"	\$1.70	2 x 2 1/4"	\$2.10
1 3/4 x 2 1/4"	1.90	2 1/2 x 2"	4.60
1 3/4 x 3 3/4"	2.00	3 x 3"	5.60
		3 x 3 1/2"	\$5.75

Ironed Poles, White, XXX—

3/4 x 2 1/4" No. 2	\$8.80
2 x 2 1/2" No. 3	8.80

Ironed Shaft, White, XXX—

1 1/2 x 2" and smaller	\$1.95
1 1/2 x 2"	2.20
1 1/2 x 2 1/4"	2.70

Farm Wagon Bows—

Round Top, 1/2 x 2"	\$.60
Flat Top, 1/2 x 2"	.75
Round Top, 3/4 x 2 1/4"	1.85

Standard Size Piano Bodies with Seats—

Each	\$4.25
------	--------

Plow Beams—

1 Horse	\$.60
2 Horse	.75
3 Horse	1.10

Spokes and Rims—

Oak and Hickory Spokes, net on Weiss & Lash List No. 6.	
Finished Rims—XX—7/8"	1.50
Finished Rims—XX—1"	1.65
Oak Rims—Discounts	40-10%
Hickory Rims	40%

Wagon Neckpoke Woods—

Keller & Tamm's List—Discount	25%
-------------------------------	-----

Wagon Whiffletree Woods—All Grades—

Keller & Tamm's List—Discount	25%
-------------------------------	-----

Oval Plow Doubletrees—

2 1/2 x 36"	\$1.60
2 x 40"	2.40
1 1/2 x 3 1/2 x 42"	\$2.75

Wagon Evener Woods—

2 x 4 and 2 x 4 1/2—Keller & Tamm's List—Discount	30%
Larger	25%

Buggy Evener Woods—All Grades

Keller & Tamm's List—Discount	25%
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Buggy Whiffletree Woods—

Mixed Second Growth and Second Growth—Keller & Tamm's List—Discount	20%
Buggy Neckpoke Woods—All Grades—Keller & Tamm's List—Discount	20%

ENGINE PRICES LOWER

200,000 customers testify to quality of Galloway-built goods. Our engines made in our factories. Modern design. Built for long, hard, continuous users' satisfaction. Don't buy until you investigate these heavy-weight, long stroke, large bore, low speeded, heavy-duty engines. Earing book free. Wm. GALLOWAY CO., BOX 145, WATERLOO, IOWA.

9875-7750-3950-3475-2675

17 95
1/2 H.P.

SIMONSEN

Hot Trimming Shear

Handiest Tool For Cutting Hot Iron And Plow Steel About The Forge. Ask any jobber or write us for circulars showing this, and our all wrought shears for cold shearing.

SIMONSEN IRON WORKS
Box 671 Sioux Rapids, Ia., U.S.A.

WE MAKE STEEL WHEELS TO FIT ANY AXLE PLAIN OR GROOVED TIRE

STEEL OR HICKORY AXLES ANY SIZE

OUR GROOVED TIRE A FULL LINE OF WOOD AND STEEL FARM TRUCKS With Steel or Wood Wheels

WRITE FOR LARGE CATALOG AND PRICES
ELECTRIC WHEEL CO., Box A, Quincy, Ill.

EMPIRE STEEL WHEELS

Plain or Grooved Tire To Fit Any Wagon Farm Trucks All Standard Types

Write today for Proposition to Blacksmiths.

Empire Mfg. Co.
P. O. Box 305
QUINCY, ILLINOIS

Best Gasoline Brazing Forge

IN THE WORLD

Thousands sold in last ten years. Four sizes. Send for Catalog.

The National Cement and Rubber Co.
308 S. St. Clair Street Toledo, Ohio, U. S. A.

"NEW EASY" 4 Sizes BOLT CLIPPERS "EASY" 2 Sizes

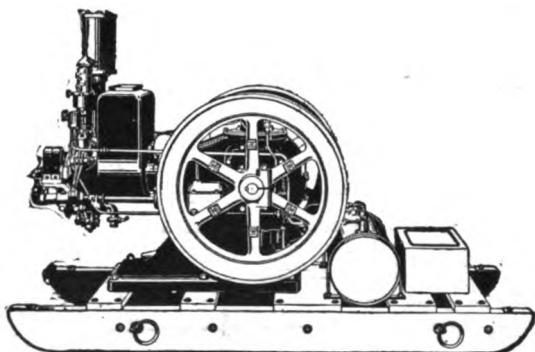
THE GENUINE TOOL

H. K. PORTER EVERETT, MASS. U. S. A.

KNOWN AND PREFERRED EVERYWHERE



Be on the Safe Side



In your shop, your mill, your factory, or your power plant, where steady, dependable power is a necessity—you can have it at no extra cost except the time it takes to investigate International Harvester engines—Titan or Mogul. Or, you can profit by the experience of thousands and choose the vital point in your shop—your engine—from the thoroughly dependable, tried and tested, responsible lines of

International Harvester Oil Engines

Buy the I H C engine exactly suited to your needs, whatever they are, give it a reasonable amount of care, and set it to work. Rest assured that your power needs will be satisfactorily supplied for years. For the emergency that may sometime come, you will always have reliable I H C service back of the engine as long as it is in use.

International Harvester engines—Titan and Mogul—are made in all approved styles, for any purpose, in sizes from 1 to 50-horse power. They operate on both low and high grade fuel oils. Find out all there is to know about the I H C engine lines. Write us for catalogues and full information.

International Harvester Company of America

(Incorporated)

Harvester Building

Chicago U S A



**TWO BIG HELPS
IN WELDING**
DON'T BE WITHOUT THEM



"E-Z" Welding Compound

is the best BECAUSE it works equally good on all kinds of steel. It welds at lower heat than any other. It sticks to metal at a very low heat. It leaves no scale. Use it once and you will always want it.

Crescent Welding Compound

makes smoother welds than any other. It is fine for plow work or where parts are fastened together before welding, or for making split welds, finishing heats, or for welding under dies, etc., etc. It insures smooth finish and perfect welds on Toe Calks.

"Money back" from any jobber if "E-Z" or Crescent does not give perfect results.

We Will Send Samples Free.

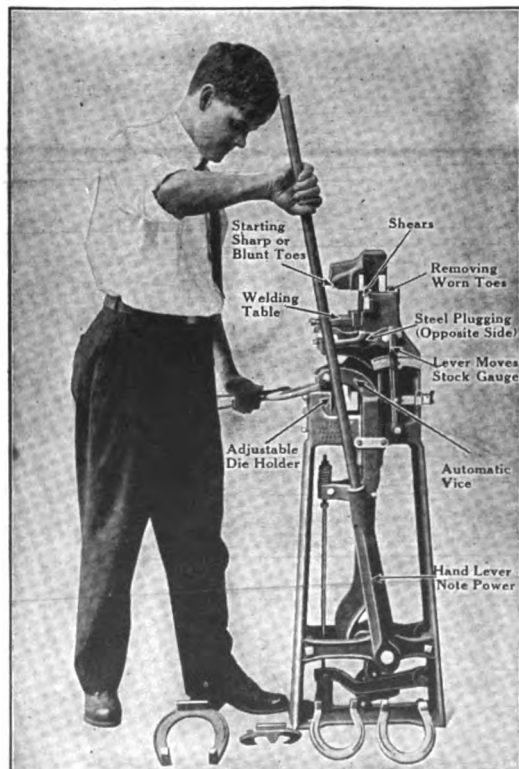
Made only by

Anti-Borax Compound Co.

FORT WAYNE, IND.

**The Greatest LABOR SAVING
Machine on Earth**

THE L. S. P. CALKING MACHINE

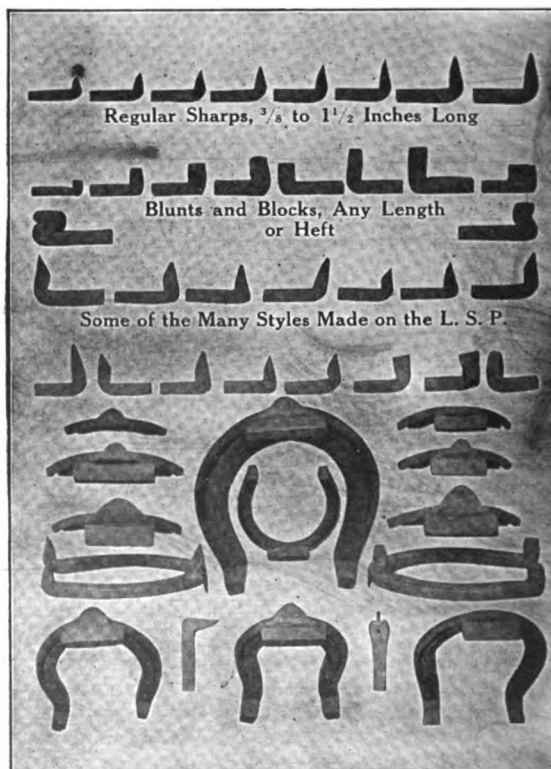


1916 MODEL—AN ENTIRELY NEW MACHINE.
Fully covered with Patents.

Our 1916 MODEL is far superior in every way to our former styles, doing a much larger range of work and a more finished job, much handier and easier to operate.

It is a strong, handsome, well-made machine, weighing 60 pounds more than our former style, but only takes up 8 x 15 inches floor space. No foot Treadle to bother, both feet on the floor. Automatic Vice which holds the shoe rigid. It does all kinds of Sharp, Blunt and Block Heeling. Starts the Toe Calks without use of hammer, removes the worn toes, welds Sharp and Blunt Toes, does Steel Plugging, rolls out a perfect, finished Clip. Work better than done by hand, with ease and in a fraction of the time. The Greatest Time and Labor Saving and Money Making Machine that ever went into a Shoeing Shop.

Write at once for full description and prices.



The above is an actual photograph of some of the work, just as it came from the machine without a hammer touching it.

L. S. P. CALKING MACHINE COMPANY

WYALUSING, PA., U. S. A.
NATIONAL MACHINE CO., BRIGHTON, ONT., CANADA



Edwards Shears

For twenty years the Two Leading Low Priced Shears in the U. S., representing the Greatest Value for the Least Money.

No. 5, weighs 200 lbs., cuts 4 x 1/2 inch soft steel
No. 10, weighs 430 lbs., cuts 4 x 3/4 inch soft steel

At their price you should have had one long ago. Order One from the first iron man that calls on you. They All Sell Them.

Write for descriptive circular and prices.

C. D. EDWARDS,

Albert Lea,

Minn.



Prentiss Patent Vises BEST MADE

Large Illustrated Catalog Free

Prentiss Vise Co., Hardware Bld., New York

MONEY SAVED IS MONEY EARNED

TRADE KALUX MARK

The Best, Cleanest and Cheapest method of hardening and tempering steel tools on the market. Send for particulars. A sample (enough for four gallons of bath) sent postpaid for fifty cents. But one sample sent to the same address.

Metal Hardening Solution Co., Rochester, N. Y., U. S. A.

TRADE NOTES AND LITERATURE

(Continued from page 42.)

Smith often thinks about, but somehow seldom accomplishes. One suggestion that seems more practical than the usual idea along this line is given in the advertise-

HORSESHOERS

Enroll Now For The Next Course

The next six weeks course in Horseshoeing for practical Horse-shoers at the New York State Veterinary College at Cornell University, begins on January The First, 1916.

This course is FREE for residents of New York State, for those who live outside of the State, there is a tuition of \$25.

Write at once for the details of the course to

Prof. Henry Asmus, N. Y. State Veterinary College,

Dept. of Farriery, Ithaca, N. Y.

This course was established to benefit you. Why not take advantage of it.

ment of The Crescent Machine Company in this issue.

One glance at this ad will show the many products and parts a Smith can make if he has the Crescent Machine. The reader who had not thought of a wood-worker in this light can obtain some very interesting information by writing to The Crescent Machine Company 245 Main St., Leetonia, Ohio. When writing to advertisers it is always advisable to mention THE AMERICAN BLACKSMITH.

How's your business library? Have you thought of it lately? Are you sure that it contains all of the books that are being offered to readers of THE AMERICAN BLACKSMITH every month?

The Smith who takes advantage of the many helpful catalogs, booklets, circulars and pamphlets which are being constantly offered to him through the columns of "Our Journal" soon has a mighty valuable collection, indeed.

Nearly all of these books or circulars contain new and helpful ideas. Often he will find just the information he has been looking for, briefly and clearly told in some piece of trade literature.

It is especially advisable to keep an up-to-date set of the general catalogs published by the large jobbers. Whenever any article of equipment or stock is required the Smith can then turn at once to one of these books and find out just what is available.

Once a Smith starts a collection of this kind he should make sure that it is kept strictly up-to-date. The easiest way to do this is to look through each issue of THE AMERICAN BLACKSMITH quite carefully noting all the new catalogs or booklets that may be offered. In this way he will miss none of the important works and

(Continued on page 49.)

Horse Shoe Bar Iron

MADE BY

The Milton Mfg.
Company

MILTON, PENN'A

Is of Superior Strength
and Quality. We can prove
it. Write us.

The Perfect Power Hammer



Note the difference in construction over other makes.

Extra Long Guides, insuring a direct movement of the ram without any side motion, which causes guides and springs to break on other hammers.

The only Hammer made with a disk attachment with special anvil for sharpening harrow and plow disks.

A recently invented Friction Clutch fitted with Ball Bearings absolutely controls the operation of the Hammer by foot pressure from the lightest tap to the heaviest blow. This ease of operation makes the hammer particularly well adapted for plow work, as you can get as light a stroke as you desire.

Will ship to any responsible party on approval. If not as represented, no sale.

Made in Two Sizes:

3 inch square, 40 lb. ram—
shipping weight, 1,150 lbs.

4 inch square, 80 lb. ram—
shipping weight, 1,800 lbs.

Write any Jobber for
Prices, or

MACGOWAN & FINIGAN
FOUNDRY & MACHINE CO.

204 North Third Street
ST. LOUIS, MO.

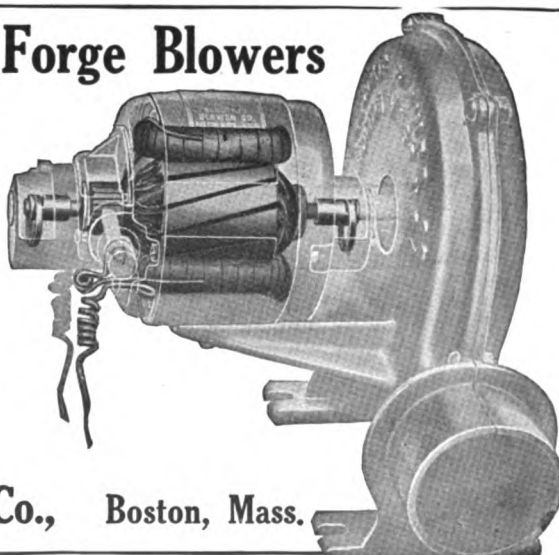
"MARVEL" Forge Blowers

This cut shows you the RING OIL BEARING design and construction of the motors used in our "ONE FIRE" \$28.00 MARVEL and on our No. 23 MARVEL \$23.00 Blowers, the windings being different.

Note the large oil rings which revolve with the CASE HARDENED shaft, keeping it running in a perfect bath of oil on the bearings. Perfect lubrication means long life.

Shipped on 30 days' trial through your dealer.

Electric Blower Co., Boston, Mass.



Pat. Oct. 19, 1909.

Use These Self Sharpening Toe Calks

Ludvigsen Bros. Welded Steel Center Calks are the choice of MANY horseshoers because they always give satisfaction.

THE HARD STEEL PLATE in the center and the two outside plates are welded together and shaped to a sharp calk that stays SHARP while it WEARS DOWN.

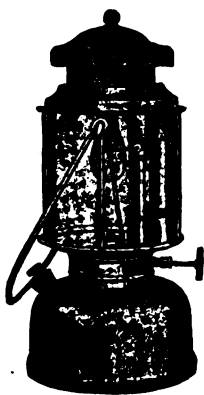
Sizes, 0 to 6.

We will gladly mail a sample of this calk to any reader of The American Blacksmith on request. BE SURE TO TELL YOUR JOBBER you want LUDVIGSEN BROS. WELDED STEEL CENTER TOE CALKS.

LUDVIGSEN BROS.,

JACKSON, MINN.,

or 47 Second St., MILWAUKEE, WIS.



The Storm King Lantern

Wind and Rain Proof
250 Candle Power

Operates 15 hours on one quart of gasoline or kerosene. Automatically cleaned; cannot clog. Can be turned high or low. Has no wicks to trim, no chimneys to wash, no smoke, no smell and no dirt.

Just the thing for farmers, dairymen, shows, fairs, sportsmen, motor boats, construction work, railroads, etc.

The Storm King weighs 3 1/2 pounds net and is 14 inches high. Put up in single cartons. A sample will be sent on trial to any rated dealer. Order a sample today; or send for further particulars.

National Stamping & Electric Works
436 S. Clinton Street, Chicago

The Beaver Dam Marsh Shoe

In describing our Marsh Shoes, used on marshy grounds in parks and boulevards, we desire to say that they give perfect satisfaction and have proven a perfect success wherever used. Made in the following sizes: No. 0 will fit horse or mule shoes No. 0 to No. 5; No. 1 will fit shoes No. 2 to No. 5 and No. 2 will fit shoes No. 4 to No. 7. When ordering mention size you wish. Write for special prices and discount.

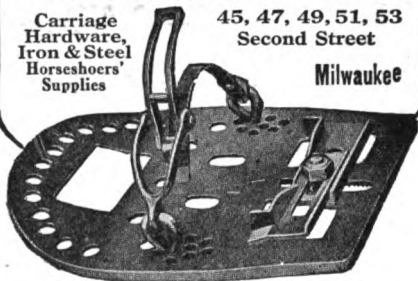
Manufactured by

SUELFLOHN & SEEFELD

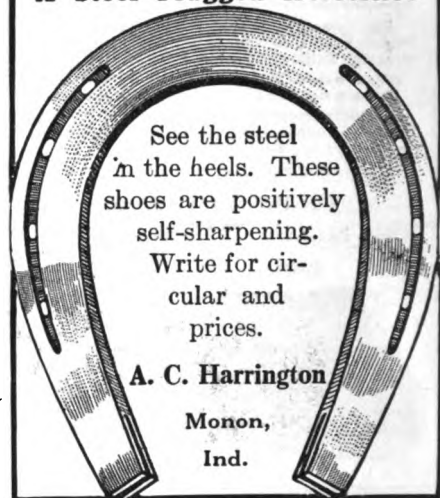
Carriage
Hardware,
Iron & Steel
Horseshoers'
Supplies

45, 47, 49, 51, 53
Second Street

Milwaukee



AT LAST A Steel Plugged Horseshoe



See the steel
in the heels. These
shoes are positively
self-sharpening.
Write for cir-
cular and
prices.

A. C. Harrington

Monon,
Ind.

Butcher Knives Made for Blacksmiths



Stamped With Your Own Name in \$5.00 Assortments. We sell by mail only, and to only one smith in each town. Every knife warranted. Write for information and send for catalog. **WOODWORTH KNIFE WORKS, Hudson, N. Y.**

EVER-READY BLANK SHARE

THE
BLACKSMITH'S
FAVORITE

Can be fitted to
more styles of
plows than can
any other pattern.



To save labor
use our Fitted
Shares for all
makes of plows.

Write for Catalog

CRESCENT FORGE & SHOVEL COMPANY

MANUFACTURERS OF HIGH GRADE
FLOWSHARES AND BLACKSMITHS' BLANKS

HAVANA, ILL., U. S. A.

HONEST DEALINGS

Before a display advertisement is accepted for this Journal, inquiry is made concerning the standing of the house signing it. Our readers are our friends and their interests will be protected. As a constant example of our good faith in *The American Blacksmith* advertisers, we will make good to subscribers loss sustained from any who prove to be deliberate swindlers. We must be notified within a month of the transaction giving rise to the complaint. This does not mean that we will concern ourselves with the settlement of petty misunderstandings between subscribers and advertisers, nor will we be responsible for losses of honorable bankrupts, nor can it include advertisements under the head of "Wanted and For Sale."

HERE IS JUST THE BOOK YOU NEED MR. AUTOMOBILE SMITH

What you want and need is a book that will not only tell you all about the automobile, how to run, operate and care for it but one that will tell you how to start in the business. One that will tell you what equipment to get—the tools, machines and supplies. One that will tell you what prices to charge, how to arrange your shop and put you right on the many things that puzzle you now. And the book that tells all of these things is

DYKE'S AUTO ENCYCLOPEDIA

The new, enlarged and revised edition is now ready. Many new subjects have been added. For example: Electric Starters, Generators and Lighting systems—Valve Lining and Ignition Lining—Complete Ford Instructor. Additional matter on Repairing and these with the 49 others departments, all in one book for one price, make Dyke's Encyclopedia one of the most complete guides, reference works and auto mechanic's companions.

You need this book in your shop. If you do any auto work at all it will help you do it right. If you want to start in the business, it will guide you right.

THE PRICE

of this great, big 640-page volume, packed with 1,750 Illustrations, is but \$3.00 (12/6), postage prepaid to any address on earth.

AMERICAN BLACKSMITH COMPANY

Box 974

BUFFALO

N. Y., U. S. A.

THE HORSE RASP OF QUALITY



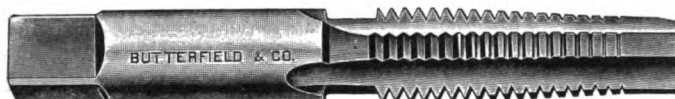
Ask your dealer for the IMPROVED HELLER RASP with keen cutting hard teeth. Made in all patterns and cuts, "Slim," "Light," "Slim Light," and "Fine Cut." Insist on getting the size, kind and cut best suited for your work. It will pay you to give them a trial. New catalogue mailed free on application.

ESTABLISHED IN 1836

HELLER BROTHERS COMPANY

NEWARK, N. J.

Butterfield's Screw Plates



We do not claim to be the oldest manufacturers of Screw Plates. We are not sure that this is any distinction.

Our claims for the superiority of our TAPS and SCREW PLATES are based on actual performance. The rapid growth of our business, is proof positive of the excellence of our product.

Be sure you ask for BUTTERFIELDS, and take no substitute.

NEW YORK STORE
126 Chambers Street

BUTTERFIELD & CO. DERBY LINE, VT., U.S.A.

DON'T WELD BROKEN SPRINGS

Give Your Customer a Satisfactory Job



Try New Era BETTER Springs.

Guaranteed even at the bolt hole—NO restrictions. Graphited (for 2 years' lubrication) between all leaves. At better price than auto factories.

Get complete 1915 list of 250 numbers and address of nearest Supply Jobber carrying stock, or wire us for any stock number listed.

Dealers' 30% discount; in lots of ten, 30-15%.

NEW ERA SPRING & SPECIALTY CO.
859 Woodward Ave., Detroit, Mich.
Ask for circulars of other low price Ford Specialties.

Thomas F. Googerty, 150 pages—Profusely Illustrated. The Bruce Publishing Company. Price, \$1.00.

This book by the well-known contributor to "Our Journal", Mr. Thomas F. Googerty, is intended primarily for the use in the forging school, though the experienced forger of ornamental work will find its pages interesting and valuable.

The book begins with the elements of forging and smithing, details the tools, equipment and requirements of practical forging and then goes into art smithing.

The first part on forging includes all details of the work from an explanation of the forge and other tools to the working of high speed steel. This section is, of course, intended only to give the student a real basis for his work in art smithing.

In the second part art smith work is detailed and the student is carefully instructed in just how to make really artistic work. From the simpler forms the reader is taken gradually to more complicated and difficult work, in each case, however, he is shown how to apply the exercise in a practical way. This book is just the volume for the beginner in art smithing.

DO NOT ACCEPT IMITATIONS

When you ask for an article you have seen advertised in The American Blacksmith, see that you get it. Don't let your dealer sell you something which he calls "just as good." Don't let a traveling man talk you into buying an inferior make. The goods advertised in these columns are made by firms whose reliability we guarantee. You run no risk whatever in buying these goods. Refuse imitations.

Insist upon getting what you ask for

TRADE NOTES AND LITERATURE

(Continued from page 45.)

his business library will always be full of timely and recent information.

The time to take advantage of this tip is NOW. The time to put it in practice is to begin with this issue. Just turn to the first page and go through this number religiously. Every advertiser who offers a catalog that is not in your shop should be written to. You will find all the firms who use the columns of "Our Journal" only too glad to send you their catalogs or other information that they have ready for distribution.

You will think a great deal of your trade library once it is an accomplished fact and here is the way to start it at practically no expense, little effort and only a few minutes of your time. Put this thought into action without delay.

One Important point every reader of "Our Journal" should remember when writing to advertisers is to mention THE AMERICAN BLACKSMITH in some part of the letter. This is more important than many readers would on first thought believe.

When a manufacturer receives a letter in which THE AMERICAN BLACKSMITH is mentioned he knows that he is dealing with a Smith who is not letting any grass grow under his feet. He knows that that Smith is active and progressive, that he must serve him quickly and well or another will take advantage of the opportunity.

You make sure of the best service obtainable when you include in your letter the information that you are a reader of THE AMERICAN BLACKSMITH. If this hasn't been your practice in the past it is a suggestion that will pay you well to adopt in all future correspondence.

If some day one of your fellow Smiths dropped into the shop with the information that he had been making a little trip around the country to pick up all the knowledge of new conditions that was available, you would listen pretty carefully to him, wouldn't you?

You would want to know all the little

points and helps he had discovered. You would want to know what the east was doing and what the west was doing, how things were going up north, how the trade was progressing in the southern states.

But, most of all, you would want to know what new ideas and helps had been brought out for the benefit of the trade in general. Such information along that line as he could give you, you would listen to eagerly and store away in your mind as carefully as was possible and after he was gone you would be continually tormented with one or more questions that you would wish you had asked him.

Did you ever think of THE AMERICAN BLACKSMITH in this way?

Yet that is just the function it performs. Every issue will tell you the very newest ideas in the trade and the better methods, better practices, better machinery that is being produced for you by the leading manufacturers of Smith shop equipment.

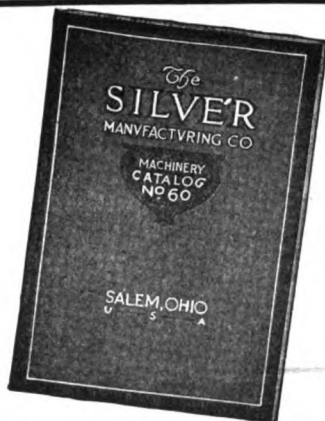
When your visitor makes his monthly call, look over the advertising pages and you will be immediately in touch with all that's new and better in Smith shop equipment. Helps, tips, suggestions, ideas, just crowd the advertising pages. They are just as important to you, just as vital, just as interesting as the editorial pages, once you become acquainted with them. They are worth more than a casual glance, they are worth your sincere attention.

Don't consider that you have read any number of THE AMERICAN BLACKSMITH until you have thoughtfully looked at each advertising page, then you will be getting every possible bit of good out of "Our Journal" and you can finally lay it aside with the knowledge that you have overlooked nothing that is new and helpful—that you are as thoroughly abreast of your trade as any of the other twenty thousand readers of "Our Journal." If this hadn't been your practice in the past NOW is a good time to begin the habit.

And once started, make it your rule throughout all the good issues to come.

NEW BOOKS.

Practical Forging and Art Smithing by



This is our New Machinery Catalog No. 60.
Send for your copy TODAY.

THE SILVER MFG. CO.

365 BROADWAY

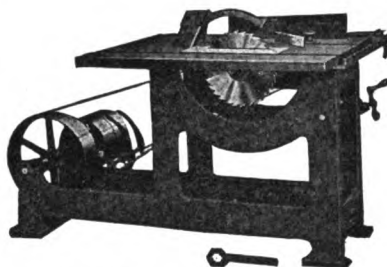
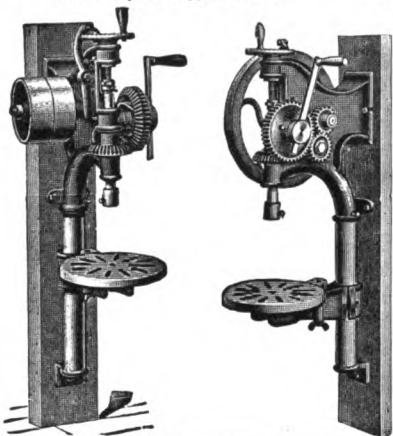
SALEM,
OHIO.

Send for Your Copy Today!

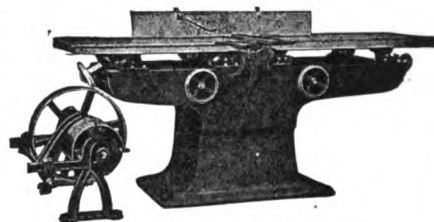
Just write a postal card "Send me your Machinery Catalog No. 60."
It will come by return mail.

This beautifully printed catalog illustrates and describes our complete lines of Carriagemakers' and Blacksmiths' tools, including Hub Boring and Spoke Tenoning machines, Band Saws in four sizes, Jointers or Buzz Planers in five sizes, Saw Tables and Swing Saws, Ball-Bearing Hand or Power Post Drills, 20-inch Power Swing Drills, and Portable Forges in a variety of styles.

There are some surprisingly good opportunities in this catalog for better, quicker and cheaper work in your shop. It's a wise move to get a copy and see for yourself.



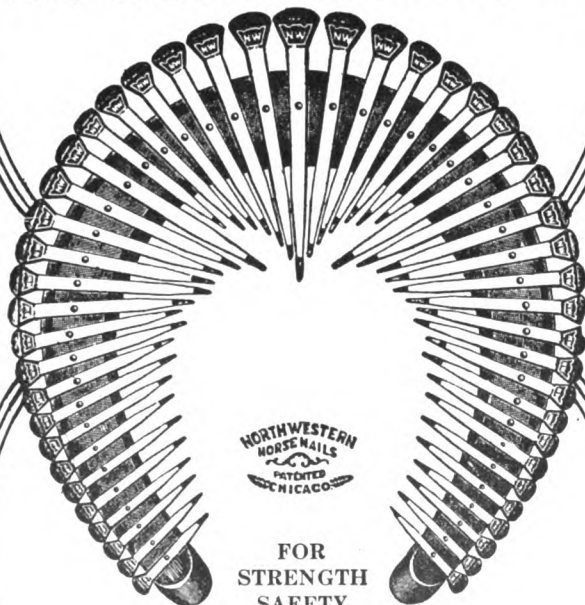
SILVER'S SAW TABLES



SILVER'S NEW JOINTERS

Five sizes—8, 12, 16, 20 and 24-inch.

NW Northwestern Horse Nails ARE THE BEST ALL AROUND



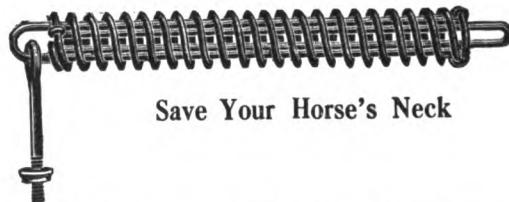
NORTHWESTERN
HORSE NAILS
PATENTED
CHICAGO

FOR
STRENGTH
SAFETY
AND
QUALITY OF MATERIAL

The most perfect in form and finish. Made of the highest grade material to our own analysis. Will hold a shoe longer than any other nail made. Note the re-enforced point makes it easiest to drive and the safest to use.

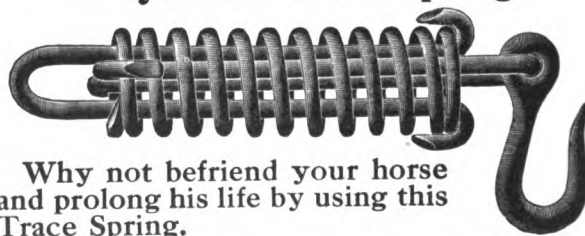
Union Horse Nail Co. Chicago, Ill.

RAYMOND POLE SPRINGS



Save Your Horse's Neck

Keystone Trace Spring



Why not befriend your horse
and prolong his life by using this
Trace Spring.

Keystone Brake Springs



Write your Jobber for Circular and Prices

RAYMOND MANUFACTURING CO.

CORRY - LIMITED - PA.



JANUARY, 1916



THE AMERICAN BLACKSMITH



CURRENT HEAVY HARDWARE PRICES.

The following quotations are the lowest prices generally prevailing December 23, 1915. They are subject to change without notice, and higher prices are charged according to quality, specification and other conditions.

The advance on iron and steel continues—a price of \$2.35 now being quoted as per the column below.

An advance to \$4.50 will also be noted on all standard brands of horse shoes. Toe calks are now \$1.35 for blunt and \$1.60 for the sharp calks.

There is a continued tendency toward advancement in prices all along the iron and steel lines and some authorities predict a shortage in steel that will send prices still higher.

Business during the past month has been generally good, though collections have not been as brisk as the previous month. A good year is looked for and all signs point to a renewed activity that will certainly be most welcome.

Automobile accessories and supplies are receiving the attention of jobbers everywhere.

Horse Shoes—	
All Iron Shoes	\$4.50
Steel Shoes	4.50
No. 0 and No. 1, 25c extra. 15c. per keg additional charged for packing more than one size in a keg.	
Mule Shoes	4.90
X. L. Steel Shoes	5.50
Countersunk Steel Shoes	5.25
Tip Shoes	5.75
Goodenough, heavy	6.00
Goodenough, sharp	6.50
Toe Weight	7.00
Slide Weight	9.25
E. E. Light Steel	5.00
Steel Driving	5.50
O. O. Mule Shoes, extra	1.50
Anvils	.11

Merchant Bar Iron—
\$2.35 rates, full extras, and 20 cents per 100 pounds extra for broken bundles.

Steel Bars—
\$2.35 rates, full extras

Toe Calks— Per Box
Blunt\$1.35
Sharp1.60

Screw Calks—	
Blissard M.... 5-16 % 7-16 1/2 %	
Sure Grip M.... 18.00 18.00 20.00 22.00 24.00	
El. Diamond M.... 18.00 18.00 20.00 22.00 24.00	
Red Tip M.... 20.00 20.00 22.00 24.00 26.00	
Bow, Jr. M.... 18.00 18.00 20.00 22.00 24.00	
R. Eg. Pt. M.... 20.00 20.00 22.00 24.00 26.00	

Plow Lays—	
Solid Cast	\$.08%
Crucible	.09%
Soft Center	.13

Fitted Plow Lays—	
Crucible, 12"	\$1.20
Crucible, 18"	1.80
Soft Center, 12"	1.95
Soft Center, 18"	2.60

Hickory Lumber—Per Foot—	
1 to 2 1/2	\$.10
2 1/2 to 4 1/2	.12

Ash and Oak Lumber—Per Foot—	
1 —1 1/4	\$.08
1 1/4 —2	.08 1/2
2 —2 1/2	.10

Yellow Poplar Lumber—Per M. Feet—	
6 to 12	\$75.00
12 to 17	78.00
17 to 24	85.00
24 to 30	90.00
30 to 36	95.00
36 to 42	100.00
42 to 48	105.00
48 to 54	110.00
54 to 60	115.00

Rough Hickory Axes—	
3 x 4 x 6 ft.	\$.75
3 1/2 x 4 1/2 x 6 ft.	1.00
4 x 5 x 6 ft.	1.20
5 x 6 x 6 ft.	2.40
4 x 5 x 6 1/2 ft.	1.75
4 1/2 x 5 1/2 x 7 ft.	2.30
5 x 6 x 7 ft.	2.80
5 x 7 x 7 ft.	3.40

Finished Hickory Axes—	
For 2 1/2 and 2 3/4 Skeins	\$.95
For 3 Skeins	1.10
For 3 1/4 Skeins	1.35
For 3 1/2 Skeins	1.50
For 3 3/4 Skeins	1.80
For 4 Skeins	2.10

Rough Oak Bolsters—	
3 x 4	\$.38
4 x 5	.60
5 x 6	1.00
4 x 4 1/2 x 12	\$.40
4 x 5 x 12	1.30
5 x 6 x 12	1.85
4 x 5 x 14	1.75
5 x 6 x 14	2.30
5 x 6 x 16	3.00

Finished Oak Bolsters—	
2 1/2 x 3 1/2 and under	\$.60
3 x 4	.85
3 1/2 x 4 1/2	.80

Rough Oak Wagon Tongues—	
4 x 4 2 x 4 x 12 and smaller	\$1.15

Finished Oak Wagon Tongues—	
3 1/2 and smaller	\$1.35
3 1/2	1.45
4	1.55

Two-Inch Sawed Hounds	
Tongues	Per Pair
Front	\$.35
Hind	.40
	.50

Wheels—	
Warren Patent—white—not tired	50%
Tiring—No. 13 and less	45%
Tiring—No. 17 and larger	30%
Screws 1 1/4" Thread and less	50%
Rivets 1 1/4" Thread and less	40%
Screws or rivets 1/2" and heavier	40%
Boring or Boring less than 10 cent lots	40%
Boring or Boring 10 sets or more of one size	60%
Priming Wheels, net	25c
Oiling, not tired, set	20c
Allowance of 25c per set on all special tired wheels with three or four piece rims.	
Oiling, not tired, No. 17 to No. 39	25c
Oiling No. 45 and larger	40c

Special Wheel Tired—"E"	
0 % x 1/4"	\$6.95
1 1/4 x 1/4"	7.20
3 1 x 1/4"	7.65
3 1 x 5-16"	7.90

Cupped Oak Hubs.	
10 x 14	\$5.80
11 x 14	4.20
11 x 15	4.50
11 x 16	5.10
12 x 16	5.75
12 x 17	6.30
13 x 18	7.00

Rough Sawed Felloes—	
1 1/4 x 2"	\$1.70
1 1/4 x 2 1/4"	1.90
1 1/4 x 3 1/4"	2.00
3 x 3 1/4"	\$5.75

Ironed Poles, White, XXX—	
3/4 x 2 1/4" No. 3	\$3.80
3 x 2 1/2" No. 3	2.80

Ironed Shaft, White, XXX—	
1 1/2 x 2" and smaller	\$1.95
1 1/2 x 2"	2.20
1 1/2 x 2 1/4"	2.70

Farm Wagon Bows—	
Round Top, 1/2 x 2"	\$.60
Flat Top, 1/2 x 2"	.75
Round Top, 3/4 x 2 1/2"	1.35

Standard Size Piano Bodies with Seats—	
Each	\$4.25

Plow Beams—	
1 Horse	\$.60
2 Horse	.75
3 Horse	1.10

Spokes and Rims—	
Oak and Hickory Spokes, net on Weiss & Lesh List No. 6.	
Finished Rims—XX—1/4"	1.50
Finished Rims—XX—1"	1.65
Oak Rims—Discounts	40-10%
Hickory Rims	40%

Wagon Neckpoke Woods—	
Keller & Tamm's List—Discount	25%

Wagon Whiffletree Woods—All Grades—	
Keller & Tamm's List—Discount	25%

Oval Plow Doubletrees—	
2 3/4 x 36"	\$1.60
2 x 40"	2.40
Flat Plow Doubletrees—	
1 1/2 x 3 1/2 x 42"	\$2.75

Wagon Evener Woods—	
2 x 4 and 2 x 4 1/4—Keller & Tamm's List—Discount	30%
Larger	25%

Buggy Evener Woods—All Grades	
Keller & Tamm's List—Discount	25%

Buggy Whiffletree Woods—	
Mixed Second Growth and Second Growth—Keller & Tamm's List—Discount	20%

Buggy Neckpoke Woods—All Grades	
Keller & Tamm's List—Discount	20%

ENGINE PRICES LOWER

200,000 customers testify to quality of Galloway-built goods. Our engines made in our factories. Modern design. Built for long, hard, continuous use. Satisfaction. Don't buy until you investigate these heavy-weight, long stroke, large bore, low speeded, heavy duty engines. Engine book free. W. M. GALLOWAY CO., Box 111 WATERLOO, IOWA.

9875-7750-3950-3475-2675

17 95
1 1/2 H.P.

FODEN'S MECHANICAL TABLES

SAVE ALL FIGURING!

Tell at a glance how much stock to use for oval or elliptical hoops of any size, the circumferences of circles, weight of flat, square and round stock, and the weight and strength of ropes and chains.

Should be in every progressive Smith's hands

Bound very neatly in green cloth. Price, 50c.

AMERICAN BLACKSMITH COMPANY, Buffalo, N.Y.

STEEL WHEELS

To Fit Any Axle
Plain or Grooved
Tire

Steel or Hickory Axles
Any Size
A Full Line of
Wood and Steel
Farm Trucks
With Steel or
Wood Wheels
Write for Large
Catalog and
Prices

ELECTRIC WHEEL CO.
Box A, Quincy, Ill.

EMPIRE STEEL WHEELS

Plain or Grooved
Tire

To Fit Any Wagon
Farm Trucks
All Standard Types

Write today for
Proposition to Blacksmiths.

Empire Mfg. Co.
P. O. Box 306
QUINCY, ILLINOIS

Best Gasoline Brazing Forge
IN THE WORLD

Thousands sold in last ten years. Four sizes.
Send for Catalog.

The National Cement and Rubber Co.
308 S. St. Clair Street Toledo, Ohio, U. S. A.

THE IMPROVED EASY HOOF TRIMMER

Will cut a hoof easier, quicker and better than any tool you have ever had. Weighs 2 1/2 pounds, opening, 2 inches, cuts one inch. Thousands of shoers are using the EASY HOOF TRIMMER with great satisfaction.

SEND A DOLLAR TODAY

Delivered to any part of the U. S. by Parcel Post.

Muncie Wheel Company, Muncie, Ind., U.S.A.

Groos Metal Shear

Cuts 1/8" Sheet Steel any width, weight 14 lbs., Steel drop forgings throughout. Vanadium Steel blades.

CHICAGO PATENTED TOOLS CO.,
1602 Owen Ave., Racine, Wis.
\$7.50 delivered to any part of U. S.



BOLT CLIPPERS

LARGE

AND

SMALL

*For Every
Requirement*

“EASY”

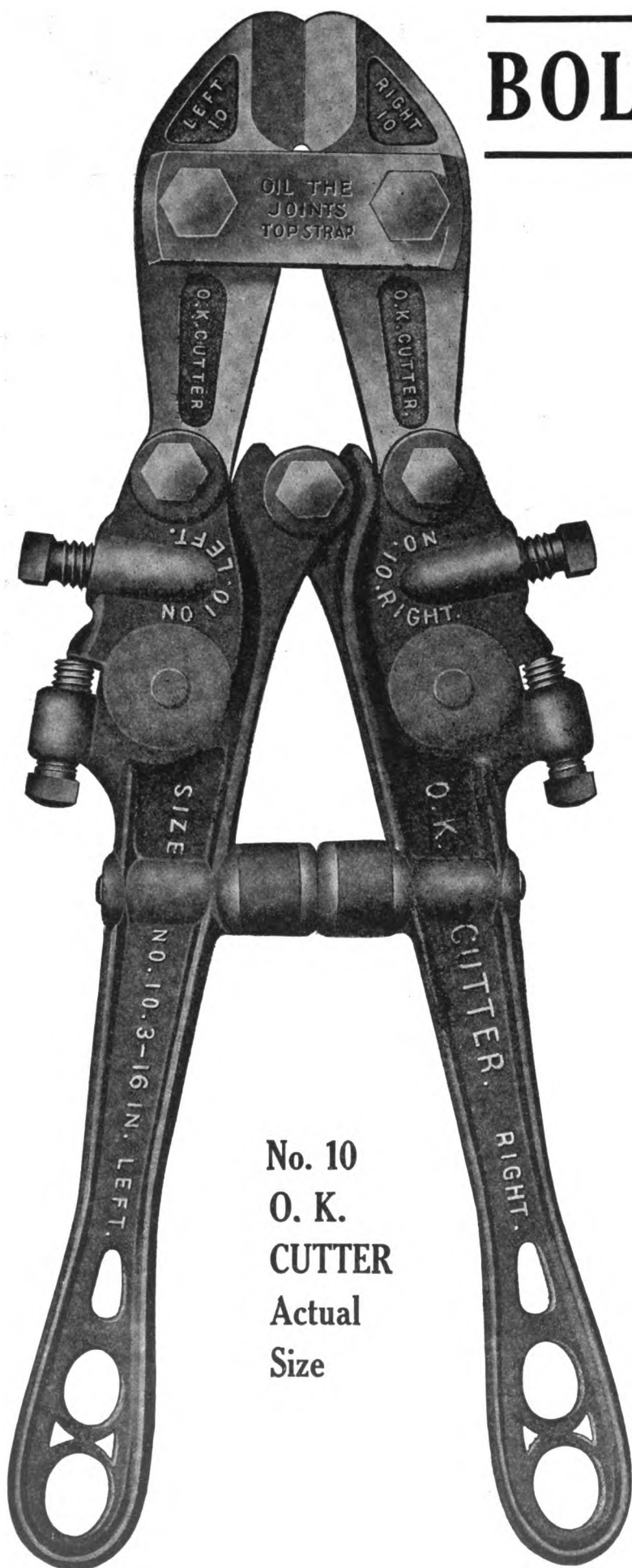
“NEW EASY”

ALLEN-RANDALL

“O. K.”

H. K. PORTER

Everett, Mass., U. S. A.



No. 10
O. K.
CUTTER
Actual
Size

**CURRENT HEAVY HARDWARE PRICES.**

The following quotations are the lowest prices generally prevailing January 29, 1916. They are subject to change without notice, and higher prices are charged according to quality, specification and other conditions. And still the advance on iron and steel continues. The lowest price now quoted to blacksmiths is \$2.50 at St. Louis with a price of \$2.55 at Chicago and from that up to \$2.90, according to the freight rate to the various jobbing centers.

The tendency toward an increase in iron and steel items generally, seems to show no immediate prospect of letting up. Practically all iron and steel lines are advancing and this advance has naturally caused a rise in the price of finished materials and machines.

Business is generally reported good in all sections of the country and prospects are bright for a continuance of this welcome business activity.

Collections are picking up as business improves. Spring should show an activity that the trade hasn't experienced in some time.

Horse Shoes—	
All Iron Shoes	\$4.50
Steel Shoes	4.50
No. 0 and No. 1, 25c extra. 15c. per keg additional charged for packing more than one size in a keg.	
Mule Shoes	4.90
X. L. Steel Shoes	5.50
Countersunk Steel Shoes	5.25
Tip Shoes	5.75
Goodenough, heavy	6.00
Goodenough, sharp	6.50
Toe Weight	7.00
Slide Weight	9.25
E. E. Light Steel	5.00
Steel Driving	5.50
O. O. Mule Shoes, extra	1.50
Amvils	.11
Merchant Bar Iron—	
\$2.55 rates, full extras, and 20 cents per 100 pounds extra for broken bundles.	
Steel Bars—	
\$2.55 rates, full extras.	
Toe Calks—	Per Box
Blunt	\$1.35
Sharp	1.60
Scrap Calks—	
Blizzard M....	5-16 3/4 7-16 1/2 %
Sure Grip M....	18.00 18.00 20.00 \$20.00 \$22.00
El. Diamond M....	18.00 18.00 20.00 22.00 22.00
Red Tip M....	20.00 20.00 22.00 22.00 24.00
Rowe, Jr. M....	18.00 18.00 20.00 20.00 22.00
R. Rg. Pt. M....	20.00 20.00 22.00 22.00 24.00
Plow Lays—	
Solid Cast	\$.08%
Crucible	.09%
Soft Center	.13
Fitted Plow Lays—	
Crucible, 12"	\$1.20
Crucible, 18"	1.80
Softer Center, 12"	1.95
Soft Center, 18"	2.60
Hickory Lumber—Per Foot—	
1 to 2 1/2	\$.10
2 1/2 to 4 1/2	.12
Ash and Oak Lumber—Per Foot—	
1 —1 1/4	\$.08 2 1/2—3 .09
1 1/4—2	.08 1/2 3 1/2—4 .10
Yellow Poplar Lumber Per M. Feet—	
6 to 12 13 to 17 18 to 24	
3/4"	\$75.00 \$75.00 \$85.00
1/2"	75.00 78.00 90.00
3/4"	78.00 85.00 95.00
1/2"	85.00 90.00 114.00
3/4"	85.00 90.00 114.00
Rough Hickory Axles—	
3 x 4 x 6 ft.	\$.75
3 1/2 x 4 1/2 x 6 ft.	1.00
4 x 5 x 6 ft.	1.30
5 x 6 x 6 ft.	2.40
4 x 5 x 6 1/2 ft.	1.75
4 1/2 x 5 1/2 x 7 ft.	2.30
5 x 6 x 7 ft.	2.80
5 x 7 x 7 ft.	3.40
Finished Hickory Axles—	
For 2 1/2 and 2 3/4 Skeins	\$.95
For 3 Skeins	1.10
For 3 1/4 Skeins	1.35
For 3 1/2 Skeins	1.50
For 3 3/4 Skeins	1.80
For 4 Skeins	2.10
Rough Oak Bolsters—	
3 x 4	\$.36 \$.40 \$1.30 \$1.35 \$1.75
4 x 5	.60 .70 2.20 2.25 3.00
5 x 6	1.00 1.20

Finished Oak Bolsters—	
2 1/2 x 3 1/2 and under	\$.80
3 x 4	.85
3 1/2 x 4 1/2	.80
Rough Oak Wagon Tongues—	
4 x 4 2 x 4 x 12 and smaller	\$1.15
Finished Oak Wagon Tongues—	
3 1/2 and smaller	\$1.35
3 3/4	1.45
4	1.55
Two-Inch Sawed Hounds	Per Pair
Tongues	\$.35
Front	.40
Hind	.50
Wheels—	
Sarven Patent—white—not tired	50%
Tiring—No. 13 and less	45%
Tiring—No. 17 and larger	30%
Screws 1 1/4" Thread and less	50%
Rivets 1 1/4" Thread and less	40%
Screws or rivets 1 1/2" and heavier	40%
Boring or Boxing less than 10 cents lots	40%
Boring or Boxing 10 sets or more of one size	60%
Priming Wheels, net	25c
Oiling, not tired, net	20c
Allowance of 25c per set on all special tired wheels with three or four piece rims.	
Oiling, not tired, No. 17 to No. 39	25c
Oiling No. 45 and larger	40c
Special Wheel Tired—"E"	Grade 2 piece Rim.
0 3/4 x 1 1/4"	\$6.95 9 1 1/4 x 1 1/4" \$ 9.35
1 3/4 x 1 1/4"	7.20 9 1 1/4 x 5-16" 9.80
3 1 x 1 1/4"	7.65 13 1 1/4 x 5-16" 12.00
3 1 x 5-16"	7.90 13 1 1/4 x 3/4" 12.40
Cupped Oak Hubs.	Plain End Oak Hubs
10 x 14	\$3.30 7 x 8 x 9 \$1.15
11 x 14	4.20 7 x 9 x 10 1.25
11 x 15	4.50 8 x 9 x 10 1.25
11 x 16	5.10 8 x 10 x 11 1.50
12 x 16	5.75 9 x 10 x 11 1.69
12 x 17	6.30 9 x 11 x 12 1.89
13 x 18	7.00 10 x 12 x 13 2.75
	11 x 13 x 14 3.90
	12 x 14 x 15 4.50
Rough Sawed Felloes—	
1 1/2 x 2"	\$1.70 2 x 2 1/2" \$2.10
1 3/4 x 2 1/4"	1.90 2 1/2 x 2" 4.60
1 3/4 x 3"	2.00 3 x 3" 5.60
3 x 3 1/2"	\$5.75
Ironed Poles, White, XXX—	
3/4 x 2 1/4" No. 2	\$3.80
2 x 2 1/2" No. 3	3.80
Ironed Shaft, White, XXX—	
1 1/2 x 2" and smaller	\$1.95
1 1/2 x 2"	2.20
1 1/2 x 2 1/4"	2.70
Farm Wagon Bows—	
Round Top, 1/2 x 2"	\$.60
Flat Top, 1/2 x 2"	.75
Round Top, 3/4 x 2 1/2"	1.35
Standard Size Piano Bodies with Seats—	
Each	\$4.25
Plow Beams—	
1 Horse	\$.60
2 Horse	.75
3 Horse	1.10
Spokes and Rims—	
Oak and Hickory Spokes, net on Wells & Lesh List No. 6.	
Finished Rims—XX—7/8"	\$1.50
Finished Rims—XX—1"	1.65
Oak Rims—Discounts	40-10%
Hickory Rims	40%
Wagon Neckpoke Woods—	
Keller & Tamm's List—Discount	25%
Wagon Whiffletree Woods—All Grades—	
Keller & Tamm's List—Discount	25%
Oval Plow Doubletrees—	Flat Plow Doubletrees
2 3/4 x 36" \$1.60	1 3/4 x 3 1/2 x 42" \$2.75
2 x 40" 2.40	
Wagon Evener Woods—	
2 x 4 and 2 x 4 1/2—Keller & Tamm's List—Discount	30%
Larger	25%
Buggy Evener Woods—All Grades	
Keller & Tamm's List—Discount	25%
Buggy Whiffletree Woods—	
Mixed Second Growth and Second Growth—Keller & Tamm's List—Discount	20%
Buggy Neckpoke Woods—All Grades	
Keller & Tamm's List—Discount	20%

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200,000 customers testify to quality of Gallo-Engine built goods. Our engines made in our factories. Modern design. Built for long, hard, continuous users' satisfaction. Don't buy until you investigate these heavy weight, long stroke, large bore, low speeded, heavy duty engines. Engines book free. Wm. GALLO-Engine Co., Box 112, WATERLOO, IOWA.

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Steel or Hickory Axles Any Size A Full Line of Wood and Steel Farm Trucks With Steel or Wood Wheels Write for Large Catalog and Prices

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Will cut a hoof easier, quicker and better than any tool you have ever had. Weight 2 1/2 pounds, opening, 2 inches, cuts one inch. Thousands of shoers are using the EASY HOOF TRIMMER with great satisfaction.

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Muncie Wheel Company, Muncie, Ind., U.S.A.

Groos Metal Shear

Cuts 1 1/4" Sheet Steel any width, weight 14 lbs., Steel drop forgings throughout. Vanadium Steel blades.

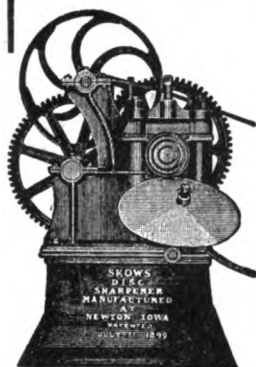
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1602 Owen Ave., Racine, Wis.
\$7.50 delivered to any part of U. S.



SKOW'S ROTARY DISC SHARPENER

is a big Money Maker in Any Shop.

Made \$229.50 in a Little Over 2 Months



We shipped this machine from factory on January 10th, 1914.

Nora Springs, Iowa, March 18, 1914.

SKOW MFG. CO., Newton, Iowa.

Dear Sirs:—We have sharpened 78 discs on our "Skow Roller" to date, which brings us \$229.50 and the end is not yet. Now can you make us a casting like No. 15 with the shank straight up for rolling coulters. We have tried them on the roller and it is O. K., but should have the casting No. 15 as above mentioned. Let us hear from you if you can make us one. Send us your bill and we will remit for same. VOLKMAN & SEAMAN.

700 of these machines in use. Sharpens cultivator and plow discs of all sizes by cold rolling. Gives a better and more permanent sharp edge than is possible by any other method.

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Skow Manufacturing Co.,

Newton, Iowa, U. S. A.



Northwestern Horse Nails ARE THE BEST ALL AROUND

For Strength, Safety And Quality Of Material

The most perfect in form and finish. Made of the Highest Grade Material to our own analysis. Will hold a shoe longer than any other nail made. Has a re-enforced point—making it easiest to drive and the safest to use.

Union Horse Nail Co.

Chicago, Ill.

Mr. Ford Owner
Mr. Ford Repairman

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By VICTOR W. PAGE

This is the most complete and practical instruction book ever published on the Ford car. A high grade cloth bound book, printed on good paper, illustrated by special drawings and photographs and describing every nook, corner, pipe, bolt and rivet of the car. It tells all about the operation of the car, driving, repairing and caring for it. How to get the best service out of the car. There are 300, 5 x 7 pages, 100 engravings and two large folding plates. Price \$1.00 or 4/6.

LOCATION OF FORD ENGINE TROUBLES

A NEW FORD ENGINE CHART BY PAGE

This chart shows clearly all portions of the Ford motor, the fuel system, the ignition system and the cooling system. It shows you just how to find any trouble and then how to remedy it. It is 25 by 38 inches, on heavy bond paper. Price 25c or 2/6.

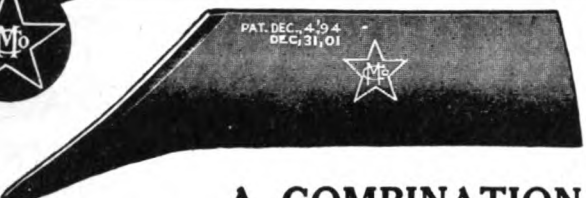
This Book and Chart make a Complete Ford Library.
They are indispensable to the Automobile Repairman.

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N. Y., U. S. A.

**A COMBINATION
HARD TO BEAT**

Your skill and Star Steel Shapes guarantee your customers a job of highest quality.

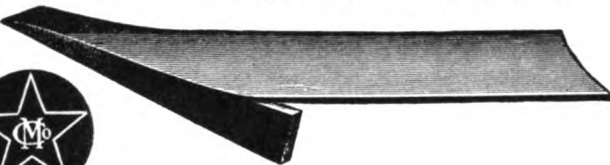
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WILL HELP YOU WIN BUSINESS.
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Look for the STAR when You Order

Plowshares	Landside Plates
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STAR MANUFACTURING COMPANY
CARPENTERSVILLE, ILLINOIS



Save an Hour a Day

During the busy grinding season and turn out cleaner, keener work by using

CHICAGO QUICK CUTTING GRINDING WHEELS

Do more grinding every day and increase your profits by using Chicago Wheels.

Chicago Wheels are made in all grades for every purpose. Write us about your work and we will tell you just how to get best wheel for your purpose. Ask for interesting catalogue and complete information.

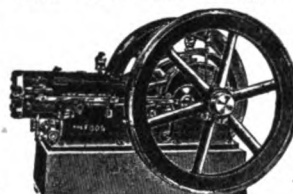
Don't forget to insist upon your dealer furnishing you with the grinding wheels you can have faith in—CHICAGO WHEELS.

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Any size required for blacksmith shop, industrial service, farming, electric lighting or water-works.



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What you want and need is a book that will not only tell you all about the automobile, how to run, operate and care for it but one that will tell you how to start in the business. One that will tell you what equipment to get—the tools, machines and supplies. One that will tell you what prices to charge, how to arrange your shop and put you right on the many things that puzzle you now. And the book that tells all of these things is

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The new, enlarged and revised edition is now ready. Many new subjects have been added. For example: Electric Starters, Generators and Lighting systems—Valve Lining and Ignition Lining—Complete Ford Instructor. Additional matter on Repairing and these with the 49 others departments, all in one book for one price, make Dyke's Encyclopedia one of the most complete guides, reference works and auto mechanic's companions.

You need this book in your shop. If you do any auto work at all it will help you do it right. If you want to start in the business, it will guide you right.

THE PRICE

of this great, big 640-page volume, packed with 1,750 Illustrations, is but \$3.00 (12/6), postage prepaid to any address on earth.

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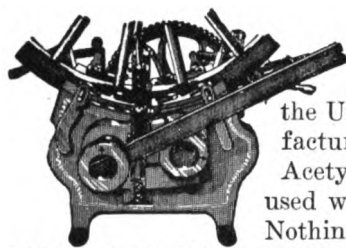
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Are the *Brooks Hydraulic Cold Tire Setters*, *The Brooks Lever Cold Tire Setters*, which are adopted and in use by the United States Government. We also manufacture Oxy-Acetylene welding machines, Acetylene generators and Welding outfits to be used with compressed cylinder gases.

Nothing better than the Brooks. Send us your address for booklet and printed matter of interest to you. **DO IT NOW.**
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THE
BLACKSMITH'S
FAVORITE

Can be fitted to
more styles of
plows than can
any other pattern.



To save labor
use our Fitted
Shares for all
makes of plows.

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"Bay State" Carriage and Tire Bolt Ratchet Wrenches

Labor
Savers!
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Three Sizes
Take Hex and
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Ask Your Dealer

THE HORSE RASP OF QUALITY



Ask your dealer for the IMPROVED HELLER RASP with keen cutting hard teeth. Made in all patterns and cuts, "Slim," "Light," "Slim Light," and "Fine Cut." Insist on getting the size, kind and cut best suited for your work. It will pay you to give them a trial. New catalogue mailed free on application.

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NEWARK, N. J.

TRADE LITERATURE AND NOTES.

Autogenous Welding and Cutting, by Theodore Kautny, and translated by James F. Whitford. 150 pages, illustrated, 5 x 7½, McGraw-Hill, New York—Prices, \$1.00 or 4/6.

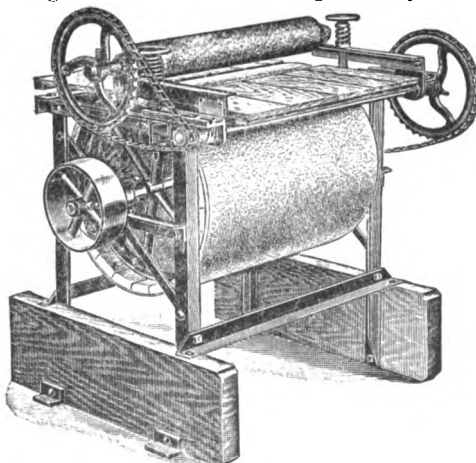
This book is an excellent addition to the material that is being published on the subject of oxy-acetylene welding and cutting. The author has attempted to meet the wants and requirements of the oxy-acetylene torch operator and has succeeded well. In translating Mr. Kautny's work, Mr. Whitford has endeavored to avoid the use of such technical terms as may confuse the individual welder.

This work introduces the subject by detailing the various gases that are used in autogenous welding. Details of acetylene and also oxygen manufacture are then explained. Fittings and welding and cutting burners are then detailed. The actual operations are covered in chapters dealing with the "Welding of Iron, Grey Cast Iron, Sheet Iron, Boilers, Manufacture of Cylindrical Vessels, Installation of Pipe, Copper, Aluminum, nickel and other metals.

The book covers the subject of autogenous welding and cutting in a thoroughly

practical manner for the practical man. It should prove a valuable aid to the oxy-acetylene operator.

The illustration shows one of the sanding machines which are being made by the



Parks Ball Bearing Machine Company. The Parks line of sanding machines are interestingly described in a new catalog

The
Campbell
Iron Company

COMPLETE ACETYLENE WELDING EQUIPMENT

Ready to Weld. Including
200-foot Oxygen Gas and
225-foot Acetylene Gas. **\$58⁵⁰**

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Catalog sent on request.)

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821 Cass Ave., St. Louis, Mo.

The Storm King Lantern

Wind and Rain Proof
250 Candle Power



Operates 15 hours on one quart of gasoline or kerosene. Automatically cleaned; cannot clog. Can be turned high or low. Has no wicks to trim, no chimneys to wash, no smoke, no smell and no dirt.

Just the thing for farmers, dairymen, shows, fairs, sportsmen, motor boats, construction work, railroads, etc.

The Storm King weighs 3¼ pounds net and is 14 inches high. Put up in single cartons. A sample will be sent on trial to any rated dealer. Order a sample today; or send for further particulars.

National Stamping & Electric Works
436 S. Clinton Street, Chicago

Butcher Knives Made for Blacksmiths



Stamped With Your Own Name in \$5.00 Assortments. We sell by mail only, and to only one smith in each town. Every knife warranted. Write for information and send for catalog. **WOODWORTH KNIFE WORKS, Piquette, N. Y.**

which has just been issued and will be sent to all readers of "Our Journal" upon request.

The Parks Ball Bearing Machine Company have sent us a very interesting description of their sanders. They state that the Sand Drum is proving to be a remarkable labor saving machine. Not only is it being used for smoothing up all kinds of hard and soft woods, but also with new sand-paper it will smooth up material that has never even been planed.

These features make the sand drum a valuable helper for the shop owner as it enables him to keep his old stock fresh as well as smooth up the new lumber as needed. The self feed is one of the features of this machine which is said to be especially helpful. It relieves the operator of the hard pressure necessary to hold the board by hand. The danger of the board being jerked from the hand also is eliminated and there is no chance of the hand becoming cut by the sand paper as the roll is covered with a coarse grade of sand-paper which serves to pull the board through.

The feed works with a link belt from drive shaft and can be changed by using different sized sprocket wheels to feed fast or slow, is adjustable to take in different thicknesses by hand wheel screws
(Continued on page 49.)



JUST WHAT YOUR SHOP NEEDS

It's wasteful practice using cold iron shears to cut hot material, and you're losing time and money when you trim hot stock on the hardy or with chisel and sledge. What you need is a

SIMONSEN HOT TRIMMER

This shear is designed and built especially for cutting HOT material, and is an every day necessity in every blacksmith shop. Unexcelled for cutting out plow points, trimming cultivator shovels, etc., and a mighty handy tool for cutting off any hot irons about the forge. Place one near your forge this year. It will surprise you how soon it will earn its cost in time and energy saved on your hot cutting and trimming.

We also manufacture shears for cold cutting. Our bench shear for cutting light stuff is one of the handiest tools ever put on any work bench. Your jobber will tell you—ask him—or write us, enclosing his name. Our circular B showing these two shears is free.

Simonsen Iron Works, Sioux Rapids, Iowa, U. S. A.
Exporters: Henry W. Peabody & Co., New York, N. Y.

"NEW
EASY"

4 Sizes

BOLT CLIPPERS

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EVERYWHERE

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We do not claim to be the oldest manufacturers of Screw Plates. We are not sure that this is any distinction.

Our claims for the superiority of our TAPS and SCREW PLATES are based on actual performance. The rapid growth of our business, is proof positive of the excellence of our product. Be sure you ask for BUTTERFIELDS, and take no substitute.

NEW YORK STORE
126 Chambers Street

BUTTERFIELD & CO. DERBY LINE, VT., U.S.A.

TRADE LITERATURE AND NOTES.

(Continued from page 46.)

which are provided with a spring to allow a variation of thickness and will take in 2½ in. between roll and sand drum. The Feed is arranged to swing down below table surface to clear table surface for extra wide material or for sanding boards on the edge.

The Double Drum Sander is furnished with feed on each drum; the one in front arranged so as to swing down in front of machine, and the other arranged to swing down in the rear of machine so as to clear table surface for extra wide material or for sanding boards on the edge. The great advantage in using the Double Drum Sander is the use of coarse paper to cut fast on the one drum and fine paper on the other for finishing, so the board will come out with a fine finish.

An interesting complete description of the sanding machines will be found in the catalog. To obtain a free copy mention THE AMERICAN BLACKSMITH in your letter, which should be addressed to the Parks Ball Bearing Machine Company, Cincinnati, Ohio.

A typographical error appeared in the advertisement of the Eureka Auto Company in the last, January, issue of THE AMERICAN BLACKSMITH. Instead of stating that the Eureka Auto Company would ship an automobile for \$100 down and the balance on easy monthly payments the ad read \$1.00 down, which, of course, was a mistake.

At \$100 down the Eureka company have a most liberal proposition and any of our readers who may have been misled by the \$1.00 down statement we

believe will readily appreciate that this was an impossible offer. The Eureka company have a special bargain bulletin which they will send upon request. To obtain a free copy address the Eureka Auto Company, Dept. 24, Beavertown, Pa., and mention THE AMERICAN BLACKSMITH.

The shop owner who is taking up automobile work and has investigated the possibilities for handling automobile tops and top covers will be particularly interested in the copyrighted measurement blank used by Buob & Scheu. This auto top cover order blank is not only copyrighted, but the patent has been applied for as it facilitates the placement of orders to a remarkable degree.

The most striking idea of the order blank is an arrangement of red arrows. By placing the measurements between the red arrows Buob & Scheu are in a position to make top covers to fit the frame of any make of car. No measurements are required for Ford top covers, however, as it is only necessary to mention the model and year when built. There are about 100 different models of cars for which no measurements are required, the name of the model and year when built being the only information necessary.

Buob & Scheu state that from their actual experience they find that ninety per cent. of the old frames are in good shape and that the only thing needed is a new cover. The order blank is interesting information for every Smith to have at hand. A complete explanation of the Buob & Scheu system together with samples of their auto top covers can be obtained by writing to them and mentioning THE AMERICAN BLACKSMITH, address-

You Can't Cut Out A BOG SPAVIN, PUFF or THOROUGHPIN, but



ABSORBINE

TRADE MARK REG. U.S. PAT. OFF.

will clean them off permanently, and you work the horse same time. Does not blister or remove the hair. \$2.00 per bottle, delivered. Will tell you more if you write. Book 4 K free. ABSORBINE, JR., the antiseptic liniment for mankind, reduces Varicose Veins, Ruptured Muscles or Ligaments, Enlarged Glands, Gout, Wens, Cysts. Always pain quickly. Price \$1.00 and \$2.00 a bottle at druggists or delivered. Manufactured only by W.F. YOUNG, P. D. F., 230 Temple St., Springfield, Mass.

MONEY SAVED IS MONEY EARNED

TRADE KALUX MARK

The Best, Cleanest and Cheapest method of hardening and tempering steel tools on the market. Send for particulars. A sample (enough for four gallons of bath) sent postpaid for fifty cents. But one sample sent to the same address.

Metal Hardening Solution Co., Rochester, N. Y., U. S. A.

Edwards Shears

For twenty years the Two Leading Low Priced Shears in the U. S., representing the Greatest Value for the Least Money.

No. 5, weighs 200 lbs., cuts 4 x ½ inch soft steel
No. 10, weighs 450 lbs., cuts 4 x ¾ inch soft steel

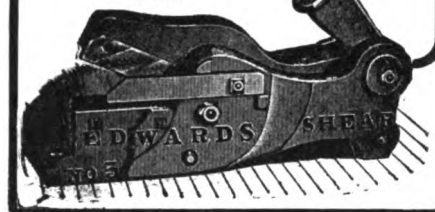
At their price you should have had one long ago. Order One from the first iron man that calls on you. They All Sell Them.

Write for descriptive circular and prices.

C. D. EDWARDS,

Albert Lea,

Minn.



ing the letter to Buob & Scheu, Cincinnati, Ohio.

Readers of "Our Journal" who are interested in Oxy-Acetylene Welding, either as a prospective line of work or one in which they are already engaged, will find a great deal of helpful information in the new catalog of The Imperial Brass Mfg. Company. This catalog is just off the press and a free copy will be sent to every reader upon request. In writing address The Imperial Brass Manufacturing Company, 1220 W. Harrison Street, Chicago, Illinois.

HAVE YOU ANY FRIENDS

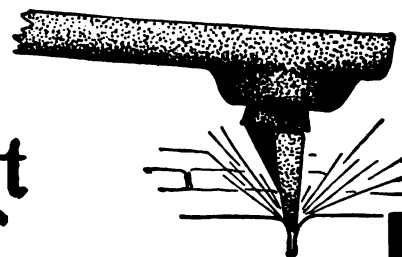
In the smithing craft whose good will you especially esteem? There is no better way of showing them your friendship than by a small gift; there is no gift which such a friend would appreciate more than a year's subscription to THE AMERICAN BLACKSMITH. It will remind him of you constantly for an entire year, and furnish him with interesting, valuable reading which he will greatly like. If you have any friends who are not subscribers, write us for terms of subscriptions for them.

AMERICAN BLACKSMITH CO.

P. O. Box 974, BUFFALO, N. Y., U.S.A.



Don't pull out or break off.



The calks fit absolutely perfect.

After they are once in the shoe they don't come out until they wear out after long service. They not only stay in because they fit, but stay in longer because they wear longer.

DIAMOND Calks and Shoes

are made of the best materials we can buy.

Steel can't be made harder or tougher than is used in our calks—that's why they keep their edge—wear so long and don't break off.

Only the best forging quality steel is used in our shoes. They are of perfect shape—easy to fit—guaranteed frost-proof, and together with Diamond calks, are the most economical and satisfactory foot-wear for horses that money will buy.

SEND FOR CATALOGUE AND PRICE LIST

Diamond Calk Horseshoe Company

DULUTH, MINNESOTA, U. S. A.

"They Wear Like a Diamond"

SQUARE DEALING

EVERY customer of this shop is entitled to a square deal—which means **GOOD SERVICE**. And this shop is entitled to a square deal from each customer—which means **PROMPT PAY**.

HANG THIS MOTTO IN YOUR SHOP

Hang one or more of these up in your shop and let your customers know where you stand. This motto was suggested in "Heats, Sparks, Welds" some time ago, and several readers asked us to print some. If you want one or more, we are willing to supply you.

This motto is 11 by 17 inches in size, printed in black ink on good heavy plate paper (not stiff cardboard) so that we can roll it easily and send it safely through the mail.

PRICES: Single copies—postage and packing prepaid—10c. or 6d. Three copies for 25c or 1s 3d.

American Blacksmith Company

Box 974

Buffalo, N. Y.,

U. S. A.



CLASSIFIED BUYERS GUIDE (Continued)

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C. D. Edwards	17	Champion Tool Company.....	16	A. Wheel, Top & Hardware Co. 50	
Little Giant Punch & Shear Co.	10	Tops and Trimmings		Cray Brothers	7
Simonsen Iron Works	17	A. Wheel, Top & Hardware Co..	50	Wheels, Metal	
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If your time is worth 50 cents per hour with your hand plane, it is worth \$4.00 per hour on one of our Jointer Heads. Blacksmiths, Wood Workers, Contractors, Saw Mill Men, etc. This means something to you. We also manufacture Grindstone Shafts to carry stones 4" thick and 36" in diameter and smaller. If you have trouble in taking old machinery apart on account of the bolts turning, read our Nut Splitter circular. Get circulars today. For sale by your Jobber. Manufactured by

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ADMIRAL WELDING EQUIPMENT at \$50.00 handles all work from lightest to heaviest, most economically. Full line of Welding Rods, Fluxes, Decarbonizer and Instruction Book included.

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AN IDEAL LIGHT for

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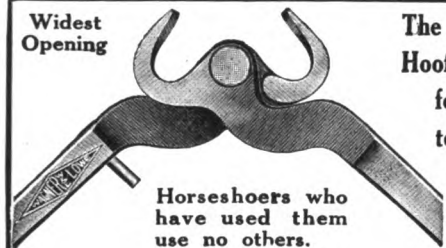
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Hoof Nippers are drop-
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Bring Your Anvil Back to Life

No matter how badly battered, broken or cracked, we can make your anvil as sound and solid as when you first struck it years ago.

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A horse shod with *welded toe calks* does not stay away from your shop two or three months at a time. The horse owner *can't* fit these calks. He *has* to bring the horse to *you*. He has to come *regularly*. If you want your shop empty half the time, use shoes in which the owner *can* fit calks. If you want better business, better profits, use

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The thing that interests you most **RIGHT NOW** is where to make the purchase of an engine.

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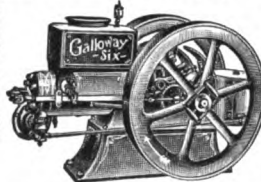
Positively the last word in powerful and economical engine construction. Stands the test of years of hard service, day in and day out. Thousands of testimonials from our customers vouch for this fact. **GUARANTEED FOR FIVE YEARS** and backed by our \$25,000

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And now again, my same old caution. **DON'T GET FOOLED** with a light weight, short stroke, small bore, short-lived engine. Buy a Galloway Masterpiece Engine and then you'll **KNOW** you're right.

Wm. Galloway, Pres. **THE WILLIAM GALLOWAY COMPANY,**
925 Galloway Station, Waterloo, Iowa.



to him. This catalog therefore will be especially valuable as it will let him know at a glance a long list of books in which he would be interested. A free copy of the catalog will be sent upon request. Just write to The Norman W. Henley Publishing Company, 132 Nassau Street, New York City.

With the spring work near at hand the Blacksmith can possibly spend quite a little time planning to make the most of this paying season. Of course, one of the chief lines of work he will be handling will be the repairing and replacing of plow and cultivator parts for the farmer. While there is nothing new or startling about this kind of work it can often be made to yield more than the ordinary profit if the smith does a little planning ahead of time.

Probably almost every reader of **THE AMERICAN BLACKSMITH** knows about Star Steel Shapes as they have long been advertised in "Our Journal". These shapes are manufactured by the Star Manufacturing Company, being produced especially to help the Blacksmith and bring him extra profits. They have long been known as the "Triple Merit" Line because they are solid cast from crucible steel and have a soft center.

Included in the Star line are the following: Plowshares, Listershares, Moldboards, Plow Points, Seeder Points, Landside Plates, Landside Points, Shovel Points, Drill Points, Subsoilers, Cultivator Shovels.

Complete information about the advantages of using these shapes will be gladly furnished to every smith who writes to the Star Manufacturing Company, Carpentersville, Illinois, and mentioning **THE AMERICAN BLACKSMITH.**

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Good as new.

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tific, technical and automobile books covering a multitude of subjects from "air brakes to "wiring diagram."

The progressive shop owner today likes to keep himself acquainted with all the available literature that can be of help

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STAR POWER HAMMER

Built in 4 sizes—30, 40, 50 and 60 pounds heads. *Star Hammers* are sold at low prices but will stand up and do as much work or more work as any other hammers of the same capacity. Thousands of satisfied users. Write today for catalog—prices and letters from users.

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A good letter-head is always better with the addition of a good illustration.

What better subject can you choose than the horse's head—what better head than the one shown here. We can supply cuts of this beautiful horse's head at 80 cents each. Use it on your letter-heads, bill-heads, envelopes, circulars, and all of your printed matter. Neat printed matter means more business for you. Send for a cut of this beautiful head today, and use it on your next batch of printing. Check, money order, stamps or registered letter will do.

AMERICAN BLACKSMITH COMPANY

P. O. Box 974

BUFFALO

N. Y., U. S. A.



CURRENT HEAVY HARDWARE PRICES.

The following quotations are the lowest prices generally prevailing February 24, 1916. They are subject to change without notice, and higher prices are charged according to quality, specification and other conditions. Advances are reported all along the line on Steel items. Present prices on Iron and Steel Bars being \$2.80 at Chicago to \$3.10 at distant point.

Anvils are also reported as advanced in price—the Plain Blacksmith Pattern being quoted at \$1.11½ and the Clip Horn at \$1.18½.

Business continues good generally with continued improvement and advancing betterment as the year grows older.

Collections are normal with promises of betterment as business continues to improve.

Horse Shoes—	
All Iron Shoes	\$4.50
Steel Shoes	4.50
No. 0 and No. 1, 25c extra.	15c. per leg additional charged for packing more than one size in a keg.
Mule Shoes	4.90
X. L. Steel Shoes	5.50
Countersunk Steel Shoes	5.35
Tip Shoes	5.75
Goodenough, heavy	6.00
Goodenough, sharp	6.50
Toe Weight	7.00
Side Weight	9.35
E. E. Light Steel	5.00
Steel Driving	5.50
O. O. Mule Shoes, extra	1.50
Anvils	11½

Merchant Bar Iron—
\$2.80 rates, full extras, and 20 cents per 100 pounds extra for broken bundles.

Steel Bars—
\$2.80 rates, full extras.

Toe Calks—	Per Box
Blunt	\$1.35
Sharp	1.60

Screw Calks—	5-16	%	7-16	1/4	%
Blissard M.	\$15.00	\$18.00	\$20.00	\$20.00	\$22.00
Sure Grip M.	18.00	18.00	20.00	22.00	22.00
El. Diamond M.	18.00	18.00	20.00	22.00	22.00
Red Tip M.	20.00	20.00	22.00	22.00	24.00
Rowe, Jr. M.	18.00	18.00	20.00	20.00	22.00
R. Eg. Pt. M.	20.00	20.00	22.00	22.00	24.00

Plow Lays—	
Solid Cast	\$.08½
Crucible	.09½
Soft Center	.13

Fitted Plow Lays—	
Crucible, 12"	\$1.30
Crucible, 18"	1.80
Softer Center, 12"	1.95
Soft Center, 18"	2.60

Hickory Lumber—Per Foot—	
1 to 2½	\$.10
2½ to 4½	.12

Ash and Oak Lumber—Per Foot—	
1 —1½	\$.08
1½ —2	.08½
2½ —3	.10

Yellow Poplar Lumber Per M. Feet—	
6 to 12	\$75.00
13 to 17	85.00
18 to 24	90.00
25 to 30	95.00
31 to 36	100.00
37 to 42	105.00
43 to 48	110.00
49 to 54	115.00
55 to 60	120.00

Rough Hickory Axes—	
3 x 4 x 6 ft.	\$.75
3½ x 4½ x 6 ft.	1.00
4 x 5 x 6 ft.	1.30
5 x 6 x 6 ft.	2.40
4 x 5 x 6½ ft.	1.75
4½ x 5½ x 7 ft.	2.80
5 x 6 x 7 ft.	2.80
5 x 7 x 7 ft.	3.40

Finished Hickory Axes—	
For 2½ and 3½ Skeins	\$.95
For 3 Skeins	1.10
For 3½ Skeins	1.35
For 4 Skeins	1.50
For 4½ Skeins	1.80
For 5 Skeins	2.10

Rough Oak Bolsters—	
3 x 4	\$.86
4 x 5	.80
5 x 6	1.00
3 x 4½	.40
4 x 5½	.70
5 x 6½	1.30
3 x 5	1.35
4 x 6	2.20
5 x 7	2.35
6 x 8	3.00

Finished Oak Bolsters—	
2½ x 3½ and under	\$.60
3 x 4	.65
3½ x 4½	.80

Rough Oak Wagon Tongues—	
4 x 4 2 x 4 x 12 and smaller	\$1.15

Finished Oak Wagon Tongues—	
3½ and smaller	\$1.85
3½	1.45
4	1.55

Two-Inch Sawed Hounds	Per Pair
Tongues	\$.85
Front	.40
Hind	.50

Wheels—	
Sarven Patent—white—not tired	50%
Tiring—No. 13 and less	45%
Tiring—No. 17 and larger	30%
Screws 1½" Thread and less	50%
Rivets 1½" Thread and less	40%
Screws or rivets ½" and heavier	40%
Boring or Boxing less than 10 cents lots	40%
Boring or Boxing 10 sets or more of one size	60%
Priming Wheels, net	25c
Oiling, not tired, set	30c
Allowance of 25c per set on all special tread wheels with three or four piece rims	
Oiling, not tired, No. 17 to No. 39	25c
Oiling No. 45 and larger	40c

Special Wheel Tired—"E"			Grade	2 piece Rim.	
0	¾ x ¼"	\$6.95	9	1½ x ¼"	\$ 9.85
1	¾ x ¼"	7.20	9	1½ x 5-16"	9.80
3	1 x ¼"	7.65	18	1½ x 5-16"	12.00
3	1 x 5-16"	7.90	18	1½ x ¾"	12.40

Cupped Oak Hubs.		Plain End Oak Hubs	
10 x 14	\$3.80	7 x 8 x 9	\$1.15
11 x 14	4.20	7 x 9 x 10	1.25
11 x 15	4.50	8 x 9 x 10	1.25
11 x 16	5.10	8 x 10 x 11	1.50
12 x 16	5.75	9 x 10 x 11	1.69
12 x 17	6.80	9 x 11 x 12	1.80
13 x 18	7.00	10 x 12 x 13	2.75
		11 x 13 x 14	3.90
		12 x 14 x 15	4.50

Rough Sawed Fellos—	
1½ x 2"	\$1.70
1½ x 2½"	1.90
1½ x 3"	2.00
3 x 3½"	\$5.75

Ironed Poles, White, XXX—	
¾ x 2½" No. 2	\$3.80
2 x 2½" No. 3	3.80

Ironed Shaft, White, XXX—	
1½ x 2" and smaller	\$1.95
1½ x 2"	2.20
1½ x 2½"	2.70

Farm Wagon Bows—	
Round Top, ½ x 2"	\$.60
Flat Top, ½ x 2"	.75
Round Top, ¾ x 2½"	1.35

Standard Size Piano Bodies with Seats—	
Each	\$4.25

Plow Beams—	
1 Horse	\$.60
2 Horse	.75
3 Horse	1.10

Spokes and Rims—	
Oak and Hickory Spokes, net on Weils & Leash List No. 6	
Finished Rims—XX—¾"	\$1.50
Finished Rims—XX—1"	1.85
Oak Rims—Discounts	40-10%
Hickory Rims	40%

Wagon Neckpoke Woods—	
Keller & Tamm's List—Discount	25%

Wagon Whimmetree Woods—All Grades—	
Keller & Tamm's List—Discount	25%

Oval Plow Doubletrees—	Flat Plow Doubletrees—
2½ x 36"	\$1.60
2 x 40"	2.40
1½ x 3½ x 42"	\$2.75

Wagon Evener Woods—	
2 x 4 and 2 x 4½—Keller & Tamm's List—Discount	30%
Larger	25%

Buggy Evener Woods—All Grades	
Keller & Tamm's List—Discount	25%

Buggy Whimmetree Woods—	
Mixed Second Growth and Second Growth—Keller & Tamm's List—Discount	20%

Buggy Neckpoke Woods—All Grades	
Keller & Tamm's List—Discount	20%

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SAVE ALL FIGURING!

Tell at a glance how much stock to use for oval or elliptical hoops of any size, the circumferences of circles, weight of flat, square and round stock, and the weight and strength of ropes and chains.

Should be in every progressive Smith's hands. Bound very neatly in green cloth. Price, 50c. AMERICAN BLACKSMITH COMPANY, Buffalo, N.Y.

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Selle Gears

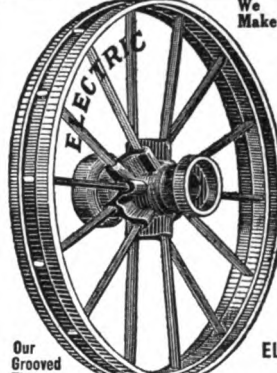
A quarter of a century of success has placed "Selle Gears" and Wagons in the hands of the largest wagon users in the world. Express and Transfer Companies, Department Stores, Fire Departments, etc., specify "Selle Gears" and will take no other after once tried.

230 page catalog free.

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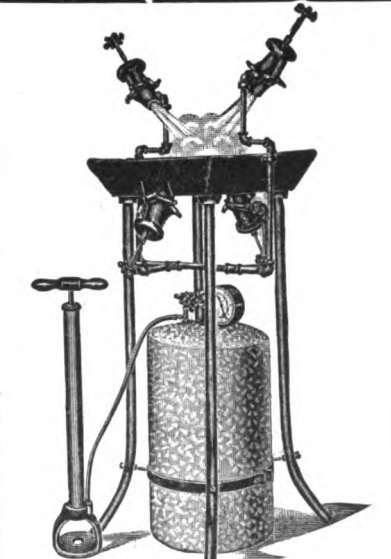
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To Fit Any Axle
Plain or Grooved
Tire
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Any Size
A Full Line of
Wood and Steel
Farm Trucks
With Steel or
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Catalog and
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Plain or Grooved
Tire
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All Standard Types
Write today for
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QUINCY, ILLINOIS

Best Gasoline Brazing Forge

IN THE WORLD

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Will cut a hoof easier, quicker and better than any tool you have ever had. Weighs 2½ pounds, opening, 2 inches, cuts one inch. Thousands of shoers are using the EASY HOOF TRIMMER with great satisfaction.

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Delivered to any part of the U. S. by
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Groos Metal Shear
Cuts ½" Sheet Steel any width,
weight 14 lbs. Steel drop forgings
throughout. Vanadium Steel blades.
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\$7.50 delivered to any part of U. S.



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37 YEARS manufacturing Blacksmith Tools gives us some authority to say that we know what your requirements are. Our line is the largest and most complete made, and before you buy, you owe it to yourself to look into Buffalo Tools.



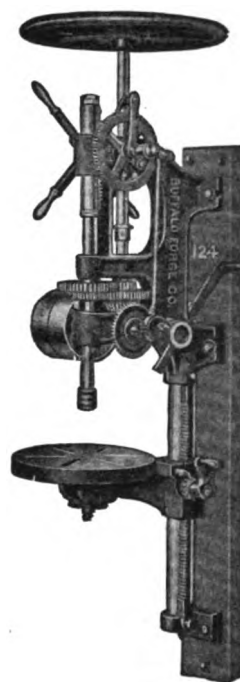
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Silent
Blower**

Made in three
sizes
12"—14"—16"
Heavy Duty
Vulcan Tuyere



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Electric Blower, No. 2-E**

Largest diameter fan. Strongest Blast. Most
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**Capstan Lever
Drill No. 124**

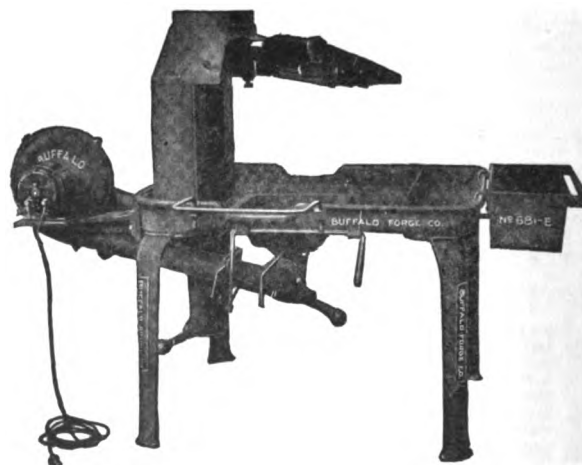
Simple and greater in
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than any other make.

Gear Guard Free.



604-E—Electric Steel Plate Forge

This forge combines lightness with great strength. The
welding capacity of this forge is unequalled.
Heats up to 12 inches.



681-E—Down Draft Electric Forge

Note the "Swing-Over" hood. Ideal for repair work
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ordinary down-draft forge.

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BUFFALO FORGE CO., BUFFALO, N. Y., U. S. A.



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Job Welding
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ADMIRAL WELDING EQUIPMENT at \$50.00 handles all work from lightest to heaviest, most economically. Full line of Welding Rods, Fluxes, Decarbonizer and Instruction Book included.

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or Gasoline. Write for particu-

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BRILLIANT GAS LAMP COMPANY

1009 F. So. Wabash Ave.,

CHICAGO, ILL.

SWEET'S
No 2 SHARP

Why it
PaystoUse
Welded
Toe Calks.

Welded calks are best for the shoer because they bring in trade instead of driving it away. The Horse Owner can't put these calks on the shoe himself. He has to come to you. He has to come regularly. That means steady work, better business, better profits.

Use SWEET'S TOE CALKS—"The Cold Cut Dreadnaught."

Franklin Steel Works

Joliet, Ill. Cambridge, Mass. Hamilton, Ont.

BETTER THAN THREE
SLEDGE HAMMERS

Little Iowa Power Hammer No. 3

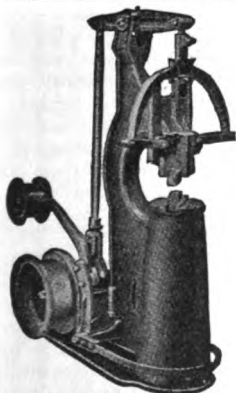
No three men can hammer out as much work as this easily operated, powerful hammer. And it has an even stroke, and accuracy impossible to attain by human efforts.

Powerful 35-pound hammer head with a total weight of 850 pounds and a compact base, 22 inches by 38 inches. Guaranteed to satisfy. If it fails, send it back at our expense. We'll refund your money. Price, \$75.00. Send for descriptive booklet.

Every United States jobber represents us. Canadian Agent: D. Ackland & Son, Ltd., Winnipeg, Can. Agent for Montevideo-Uruguay, Casa en Pando: Ambrosia Bertolotti.

MODERN SALES CO.

Hampton, Iowa - - U. S. A.

"A Satisfied Customer is the Best
Advertisement"

Experience of a quarter-century in making flexible shaft Hand and Power Machines for Clipping Horses, Mules, Cows, Dogs and for shearing Sheep etc., has given us an expert knowledge of this art. "GILLETTE" clipping machines and parts are guaranteed as to materials and workmanship.



"Gillette" cutters are unexcelled. Efficiency is our aim.

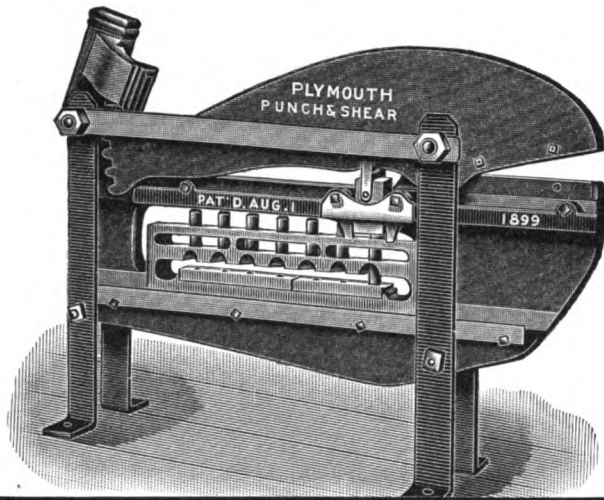
Grinding and repair work is our specialty. Renewal and repair parts carried on hand.

Illustrated Price List Free.

Order Direct or Through Your Dealer.

Gillette Clipping Machine Co.,

110-114 West 32nd Street, New York, N. Y.



YOU ARE LOSING MONEY BY NOT HAVING THIS PUNCH AND SHEAR IN YOUR SHOP

In every blacksmith and repair shop the Plymouth Punch and Shear will save much valuable time and labor. Is always ready to handle quickly all the punching and shearing you do.

The only machine that will punch SEVEN DIFFERENT size holes— $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$. Special shape or different size punches may be substituted if desired. The position to punch any size can be changed in a second without the aid of a wrench or other tools.

Will cut—4 x $\frac{1}{2}$ in. or 3 x $\frac{5}{8}$ in. flat iron 1 in. round iron.

The Plymouth Punch and Shear is made of best material, fully guaranteed and will last a lifetime with proper care.

ASK YOUR SUPPLY HOUSE

For a Plymouth Punch and Shear. If they cannot furnish it WRITE US DIRECT and we will see that you are taken care of. Don't accept any other "just as good". Circulars sent on request.

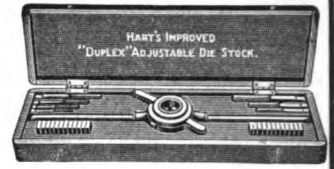
Plymouth Foundry & Machine Co., Plymouth, Wis., U. S. A.

"DUPLEX" BOLT DIE STOCK SETS.

They contain dies that adjust without a wrench and require no reversing after cutting.

THE HART MFG. CO.

2325 E. 20th St. Cleveland, O.



Just to remind you of

The Searchlight Co.

makers of the Searchlight Oxy-Acetylene Welding and Cutting Apparatus and of Searchlight Gas—the pure, dry, compressed acetylene. Complete literature upon request.

Chicago

Never Accept Imitations

When a dealer or jobber tries to impose substitutes for the *good advertised articles*, write us or the manufacturer. We will see that you get the genuine—what you want.

HORSESHOERS

Enroll Now For The Next Course

The next six weeks course in Horseshoeing for practical Horse-shoers at the New York State Veterinary College at Cornell University, begins on MAY The First, 1916.

This course is FREE for residents of New York State, for those who live outside of the State, there is a tuition of \$25.

Write at once for the details of the course to

Prof. Henry Asmus, N.Y. State Veterinary College,

Dept. of Farriery, Ithaca, N. Y.

This course was established to benefit you. Why not take advantage of it.

TRADE LITERATURE AND NOTES.

Wagon Builders and Repairers, who are looking for quick selling, profitable and trade building specialties, will be interested in the advertisement of Falkenhainer & Company, St. Louis, Mo.

On account of the ready applicability of these Springs on all manner of spring vehicles, and the comprehensive list of sizes manufactured, their selling scope is said to be practically unlimited.

In St. Louis, as well as in many other of the larger cities, many thousands of Falkenhainer Springs are in use. Grocers', Butchers', Milk Dealers', Bottlers', Ice Cream Manufacturers', Hucksters', Florists', Fruit Growers', Laundry, Express and Baggage wagons, and other light wagons are equipped with them.

The heavier types of wagons, such as are used by Wholesale Fruit and Produce dealers, Commission Merchants, Meat Companies, Provision Dealers, Furniture manufacturers and dealers, Moving and Storage concerns, Wholesale Grocers, Flour Mills, Planing Mills, Box Factories, Breweries, Distilling Companies, Transfer and Drayage Companies, etc., etc., may be observed on the streets at all times,

The Perfect Power Hammer



Note the difference in construction over other makes.

Extra Long Guides, insuring a direct movement of the ram without any side motion, which causes guides and springs to break on other hammers.

The only Hammer made with a disk attachment with special anvil for sharpening harrow and plow disks.

A recently invented Friction Clutch fitted with Ball Bearings absolutely controls the operation of the Hammer by foot pressure from the lightest tap to the heaviest blow. This ease of operation makes the hammer particularly well adapted for plow work, as you can get as light a stroke as you desire.

Will ship to any responsible party on approval. If not as represented, no sale.

Made in Two Sizes:

3 inch square, 40 lb. ram—shipping weight, 1,150 lbs.

4 inch square, 80 lb. ram—shipping weight, 1,800 lbs.

Write any Jobber for Prices, or

**MACGOWAN & FINIGAN
FOUNDRY & MACHINE CO.**

204 North Third Street
ST. LOUIS, MO.

equipped with Falkenhainer Springs and beautifully demonstrating their merits.

Falkenhainer Springs are sold strictly through the legitimate wagon and supply trades and a fair margin of profit is assured for the wagon man. The manufacturers invite correspondence with interested parties everywhere. Address Falkenhainer & Company, St. Louis, Mo., and

mention THE AMERICAN BLACKSMITH when writing.

How many smiths know how to figure exactly the work of an engine? That is a mighty important question whether the shop owner is already using power or whether he is simply contemplating the advantages to be gained by putting in a shop engine.

Edward H. Witte, President of the Witte Engine Works, makers of Witte Engines, which are well known to the readers of "Our Journal", has just brought out a valuable free book which is intended to give this important information. The book is attractively illustrated and simply, clearly written.

Every reader of THE AMERICAN BLACKSMITH can obtain a free copy of this book by writing to E. H. Witte, 176 S. Oakland Avenue, Kansas City, Mo.

NEW BOOKS

Statement of Truth and Scientific Facts by Louis Petersen, 82 pages.

This book by the scientific horseshoer of Santa Ana, Calif., is prefaced with the following: "The work has been written in hope of meeting a long felt want. My life is such that I wish for no praise. I only hope and believe I have done my duty." And in the pages following this preface, Mr. Petersen has dwelt upon not only horseshoeing, but the cause of the Great World War, with an occasional paragraph on marriage.

It is unnecessary to say that Mr. Petersen is a staunch lover of the horse and has done much in an effort to improve shoeing knowledge among horse shoers. In this book he illustrates a number of practical shoes in which the average shoer will be much interested. Send orders direct to Mr. Louis Petersen at Santa Ana, Calif.

**CURRENT HEAVY HARDWARE PRICES.**

The following quotations are the lowest prices generally prevailing March 18, 1916. They are subject to change without notice, and higher prices are charged according to quality, specification and other conditions. Iron and steel have jumped to \$3.10 at Chicago with a price of \$3.40 at distant points. Advances are also reported on Toe Calks and Horsenails. Prices on Toe Calks will be noted in the column below.

Business all over the country is generally reported good.

Collections are normal for this season.

Reports continue as to the serious inroads that the automobile is making in the trade and the number of general smiths taking up auto repairing is increasing.

Horse Shoes—

All Iron Shoes	\$4.50
Steel Shoe	4.50
No. 0 and No. 1, 25c extra, 15c. per keg additional charged for packing more than one size in a keg.	
Mule Shoes	4.90
X. L. Steel Shoes	5.50
Countersunk Steel Shoes	5.25
Tip Shoes	5.75
Goodenough, heavy	6.00
Goodenough, sharp	6.50
Toe Weight	7.00
Side Weight	9.25
E. E. Light Steel	5.00
Steel Driving	5.50
O. O. Mule Shoes, extra	1.50

Anvils 11 1/2

Merchant Bar Iron—

\$3.10 rates, full extras, and 20 cents per 100 pounds extra for broken bundles.

Steel Bars—

\$3.10 rates, full extras.

Toe Calks—

	Per Box
Blunt	\$1.45
Sharp	1.70

Screw Calks—

	5-16	%	7-16	1/2	%
Blizzard M.	\$18.00	\$18.00	\$20.00	\$20.00	\$22.00
Sure Grip M.	18.00	18.00	20.00	22.00	22.00
Bl. Diamond M.	18.00	18.00	20.00	22.00	22.00
Red Tip M.	20.00	20.00	22.00	22.00	24.00
Rowe, Jr. M.	18.00	18.00	20.00	20.00	22.00
R. Rg. Pt. M.	20.00	20.00	22.00	22.00	24.00

Plow Lays—

Solid Cast	\$.08 1/2
Crucible	.09 1/2
Soft Center	.13

Fitted Plow Lays—

Crucible, 12"	\$1.20
Crucible, 18"	1.80
Softer Center, 12"	1.95
Soft Center, 18"	2.60

Hickory Lumber—Per Foot—

1 to 2 1/2	\$.10
2 1/2 to 4 1/2	.12

Ash and Oak Lumber—Per Foot—

1 to 1 1/2	\$.08	2 1/2 to 3	\$.09
1 1/2 to 2	.08 1/2	3 1/2 to 4	.10

Yellow Poplar Lumber Per M. Feet—

	6 to 12	13 to 17	18 to 24
3/4"	\$75.00	\$85.00	
1/2"	75.00	78.00	90.00
3/8"	78.00	85.00	95.00
1/4"	85.00	90.00	114.00
3/16"	85.00	90.00	114.00

Rough Hickory Axles—

3 x 4 x 6 ft.	\$.75
3 1/2 x 4 1/2 x 6 ft.	1.00
4 x 5 x 6 ft.	1.30
5 x 6 x 6 ft.	2.40
4 x 5 x 6 1/2 ft.	1.75
4 1/2 x 5 1/2 x 7 ft.	2.30
5 x 6 x 7 ft.	2.80
5 x 7 x 7 ft.	3.40

Finished Hickory Axles—

For 2 1/2 and 2 3/4 Skeins	\$.95
For 3 Skeins	1.10
For 3 1/4 Skeins	1.35
For 3 1/2 Skeins	1.50
For 3 3/4 Skeins	1.80
For 4 Skeins	2.10

Rough Oak Bolsters—

3 x 4	\$.36	4 x 4 1/2	\$.40	12 x 14	\$1.35	14 x 16	\$1.75
4 x 5	.60	5 x 6	.70	22 x 20	2.25	30 x 0	
5 x 6	1.00	1.20					

Finished Oak Bolsters—

2 3/4 x 3 3/4 and under	\$.60
3 x 4	.65
3 3/4 x 4 1/4	.80

Rough Oak Wagon Tongues—

4 x 4 2 x 4 x 12 and smaller	\$1.15
------------------------------	--------

Finished Oak Wagon Tongues—

3 1/2 and smaller	\$1.35
3 3/4	1.45
4	1.55

Two-Inch Sawed Hounds

	Per Pair
Tongues	\$.85
Front	.40
Hind	.50

Wheels—

Sharven Patent—white—not tired	50%
Tiring—No. 13 and less	45%
Tiring—No. 17 and larger	30%
Screws 1 1/4" Thread and less	50%
Rivets 1 1/4" Tread and less	40%
Screws or rivets 1/2" and heavier	40%
Boring or Boxing less than 10 cents lots	40%
Boring or Boxing 10 sets or more of one size	60%
Priming Wheels, net	25c
Oiling, not tired, set	20c
Allowance of 25c per set on all special tired wheels with three or four piece rims	
Oiling, not tired, No. 17 to No. 39	25c
Oiling No. 45 and larger	40c

Special Wheel Tired—"E"

	Grade	2 piece Rim
0 3/4 x 1 1/4"	\$6.95	9 1 1/4 x 1 1/4" \$ 9.35
1 3/4 x 1 1/4"	7.20	9 1 1/4 x 5-16 9.80
3 1 x 1 1/4"	7.65	13 1 1/4 x 5-16" 12.00
3 1 x 5-16"	7.90	13 1 1/4 x 5/8" 12.40

Cupped Oak Hubs.

	Plain End Oak Hubs
10 x 14	\$3.30
11 x 14	4.20
11 x 15	4.50
11 x 16	5.10
12 x 16	5.75
12 x 17	6.30
13 x 18	7.00
7 x 8 x 9	\$1.15
7 x 9 x 10	1.25
8 x 9 x 10	1.25
8 x 10 x 11	1.50
9 x 10 x 11	1.69
9 x 11 x 12	1.80
10 x 12 x 13	2.75
11 x 13 x 14	3.90
12 x 14 x 15	4.50

Rough Sawed Fellos—

1 1/2 x 2"	\$1.70	2 x 2 1/2"	\$2.10
1 1/2 x 2 1/4"	1.90	2 1/2 x 2"	4.60
1 1/2 x 3"	2.00	3 x 3"	5.60
3 x 3 1/2"	\$5.75		

Ironed Poles, White, XXX—

3/4 x 2 1/4" No. 2	\$3.80
2 x 2 1/2" No. 3	3.80

Ironed Shaft, White, XXX—

1 1/2 x 2" and smaller	\$1.95
1 1/2 x 2"	2.20
1 1/2 x 2 1/4"	2.70

Farm Wagon Bows—

Round Top, 1/2 x 2"	\$.60
Flat Top, 1/2 x 2"	.75
Round Top, 3/4 x 2 1/2"	1.35

Standard Size Piano Bodies with Seats—

Each	\$4.25
------	--------

Plow Beams—

1 Horse	\$.60
2 Horse	.75
3 Horse	1.10

Spokes and Rims—

Oak and Hickory Spokes, net on Weiss & Lesh List No. 6.	
Finished Rims—XX—7/8"	\$1.75
Finished Rims—XX—1"	1.65
Oak Rims—Discounts	40-10%
Hickory Rims	40%

Wagon Neckyoke Woods—

Keller & Tamm's List—Discount	25%
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Wagon Whiffletree Woods—All Grades—

Keller & Tamm's List—Discount	25%
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Oval Plow Doubletrees—

2 3/4 x 38"	\$1.60	1 3/4 x 3 1/2 x 42"	\$2.75
2 x 40"	2.40		

Wagon Evener Woods—

2 x 4 and 2 x 4 1/2—Keller & Tamm's List—Discount	30%
Larger	25%

Buggy Evener Woods—All Grades

Keller & Tamm's List—Discount	25%
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Buggy Whiffletree Woods—

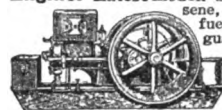
Mixed Second Growth and Second Growth—Keller & Tamm's List—Discount	20%
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Buggy Neckyoke Woods—All Grades

Keller & Tamm's List—Discount	20%
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WEBER ENGINES

Lowest-Priced Throttle-Governed Kerosene Engine. Latest model. Saves 1/2 fuel. Uses kerosene, gasoline, or any kind of fuel. 2 Months Trial. 5-Year guarantee. Write today for Big Special Offer. Address

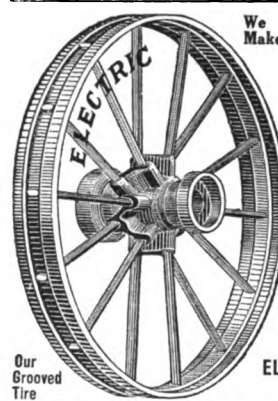


WEBER ENGINE CO.
Dept. 185A
KANSAS CITY, MO.

"GEARS AND WAGONS"**Selle Gears**

A quarter of a century of success has placed "Selle Gears" and Wagons in the hands of the largest wagon users in the world. Express and Transfer Companies, Department Stores, Fire Departments, etc., specify "Selle Gears" and will take no other after once tried.

230 page catalog free
THE AKRON-SELLE CO. Akron, Ohio

**STEEL WHEELS**

To Fit Any Axle
Plain or Grooved
Tire

Steel or
Hickory Axles
Any Size

A Full Line of
Wood and Steel
Farm Trucks

With Steel or
Wood Wheels
Write for Large
Catalog and
Prices

ELECTRIC WHEEL CO.
Box A, Quincy, Ill.

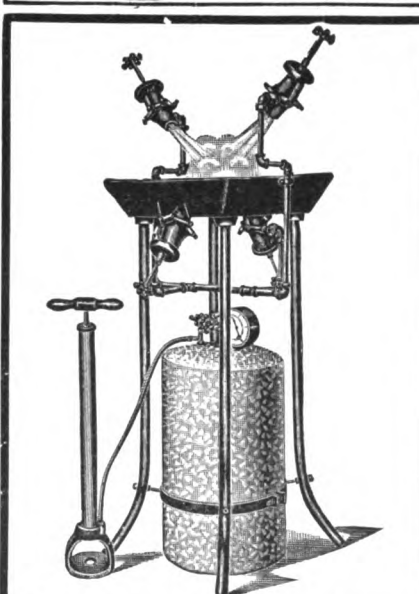
EMPIRE**STEEL WHEELS**

Plain or Grooved
Tire
To Fit Any Wagon

Farm Trucks
All Standard Types

Write today for
Proposition to Blacksmiths.

Empire Mfg. Co.
P. O. Box 306
QUINCY, ILLINOIS

**Best Gasoline Brazing Forge**

IN THE WORLD
Thousands sold in last ten years. Four sizes.
Send for Catalog.

The National Cement and Rubber Co.
308 S. St. Clair Street Toledo, Ohio, U. S. A.



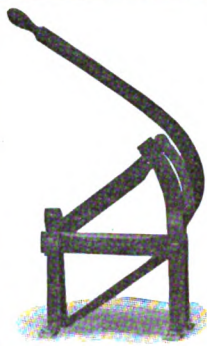
THE IMPROVED EASY HOOF TRIMMER
Will cut a hoof easier, quicker and better than any tool you have ever had. Weight 2 1/2 pounds, opening, 2 inches, cuts one inch. Thousands of shoers are using the EASY HOOF TRIMMER with great satisfaction.

SEND A DOLLAR TODAY
Delivered to any part of the U. S. by
Parcels Post.

Muncie Wheel Company, Muncie, Ind., U.S.A.

**Groos Metal Shear**

Cuts 1/8" Sheet Steel any width, weight 14 lbs., Steel drop forgings throughout. Vanadium Steel blades. CHICAGO PATENTED TOOLS CO., 1602 Owen Ave., Racine, Wis. \$7.50 delivered to any part of U. S.

**JUST WHAT YOUR SHOP NEEDS**

Save 75% of the Time and Over 50% of the Hard Work
connected with your hot cutting jobs by the use of a

Simonsen Hot Trimmer

It is an actual fact that with this shear you not only save time and hard work which will add much to your profits during the season, but many of the jobs you now hate will become a pleasure to you when you find how you can do them so easily and with such added profits.
Ask your jobber—or write us mentioning his name. Our circular B, showing several styles of shears, is free.

SIMONSEN IRON WORKS, SIOUX RAPIDS, IOWA, U. S. A.
Exporters: Henry W. Peabody & Co., New York, N. Y.

**IT "CHASES WORK"**

The thing that interests you most RIGHT NOW is where to

make the purchase of an engine.

The height of efficiency in engine power! You can't find its superior at any price. Honestly manufactured. An unheard of offer. Simple in design, thorough in construction, perfect in operation and adapted to every purpose. Galloway Masterpiece Engines answer the most exacting demands.

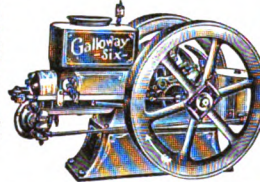
Positively the last word in powerful and economical engine construction. Stands the test of years of hard service, day in and day out. Thousands of testimonials from our customers vouch for this fact. **GUARANTEED FOR FIVE YEARS** and backed by our \$25,000 **GUARANTY BANK BOND.**

There are so many high grade features that contribute to the popularity and success of Galloway engines that it is almost impossible to single out any one of them as the best. Features of these make them mechanically correct, so simple and so universally popular that investigation means owning and operating one.

Yours for ninety days' free trial, under any of the six plans as explained in my new 1916, 250-page catalog.

And now again, my same old caution. **DON'T GET FOOLED** with a light weight, short stroke, small bore, short-lived engine. Buy a Galloway Masterpiece Engine and then you'll KNOW you're right.

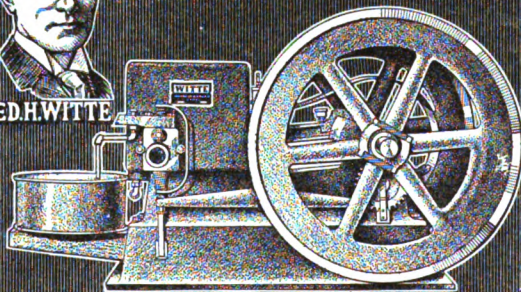
Wm. Galloway, Pres., **THE WILLIAM GALLOWAY COMPANY,**
925 Galloway Station, Waterloo, Iowa.

**WITTE "SURPLUS SIX"**

**SOLD FOR 6 H.P.
PULLS 9 H.P.**

ONLY

\$97⁷⁵



**KEROSENE, GASOLINE, NAPHTHA,
DISTILLATE OR GAS.**

**ANY SIZE - 2, 3, 4, 6,
8, 12, 16, OR 22 H.P.
ALL LESS THAN
\$17⁵⁰ Per H.P.**

90 DAYS IN WHICH TO TRY A WITTE

MY 1916 Model engines are the greatest value that I have known to be offered at anything like the price. All sizes will pull from 30 to 50 per cent over factory rating. They are sturdy and dependable—expert built and high quality in every respect. Lowest cost of operation.

**Trial Offer
Easy Terms**

one on your farm—try it out thoroughly—and let me know your decision.

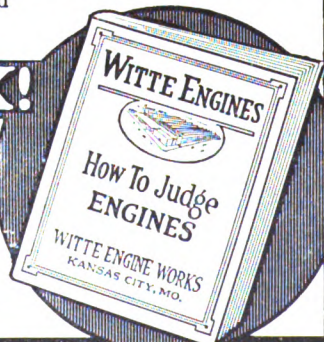
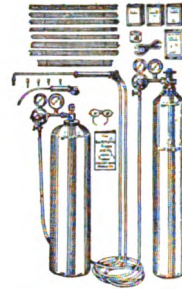
I want you to be the judge of my engine. Write today for my free trial offer. Find out for yourself that WITTE engines are not "cheap" engines but are high quality engines **priced low.** Use

GET THIS FREE BOOK!

Don't buy **any** engine blindly. Send for this book. Learn "inside" facts about the engine business. Full of interesting—some startling—information.

ED. H. WITTE, Witte Engine Works

1769 Oakland Ave., Kansas City, Mo.
1769 Empire Building, Pittsburgh, Pa.

**The
Campbell
Iron Company****COMPLETE ACETYLENE
WELDING EQUIPMENT**

Ready to Weld. Including
200-foot Oxygen Gas and
225-foot Acetylene Gas. **\$58⁵⁰**

Tanks Loaned in Central West

Headquarters for Welding Rods, Fluxes,
Goggles, etc.

Write for Free Printed Matter.

Address

St. Campbell 821 Cass Ave.
St. Louis, Mo.

**Horse Shoe
Bar Iron**

MADE BY

**The Milton Mfg.
Company**

MILTON, PENN'A

Is of Superior Strength
and Quality. We can prove
it. Write us.

FODEN'S MECHANICAL TABLES

SAVE ALL FIGURING!

Tell at a glance how much stock to use for oval or elliptical hoops of any size, the circumferences of circles, weight of flat, square and round stock, and the weight and strength of ropes and chains.

Should be in every progressive Smith's hands.
Bound very neatly in green cloth. Price, 50c.
AMERICAN BLACKSMITH COMPANY, Buffalo, N. Y.

**CURRENT HEAVY HARDWARE PRICES.**

The following quotations are the lowest prices generally prevailing April 18, 1916. They are subject to change without notice, and higher prices are charged according to quality, specification and other conditions.

Iron and steel have taken another stride forward—these items are now \$3.80 at Chicago, and from that all the way to \$3.60 according to freight differential.

The horseshoe manufacturers have also advanced the prices on their product, which it will be noted, are now listed at \$5.00. Anvil prices have advanced to 12½ cents for the Plain and 14½ for the Clip Horn. Prices are: Horse nails are quoted as follows: Union, \$3.25; Star, \$3.75; Leader, \$2.75.

Further advances are expected, as the end has not yet been reached. Business seems to be universally good with continued tendency toward still greater prosperity. Collections are good.

Horse Shoes—

All Iron Shoes	\$5.00
Steel Shoes	5.00
No. 0 and No. 1, 25c extra. 15c. per keg additional charged for packing more than one size in a keg.	
Mule Shoes	
X. L. Steel Shoes	
Counterwink Steel Shoes	
Tip Shoes	
Goodenough, heavy	
Goodenough, sharp	
Toe Weight	
Side Weight	
M. E. Light Steel	
Steel Driving	
O. O. Mule Shoes, extra	

Anvils 12½

Merchant Bar Iron—

extra for broken bundles.

\$3.30 rates, full extras, and 20 cents per 100 pounds

Steel Bars—

\$3.30 rates, full extras.

Toe Calks—

	Per Box
Blunt	\$1.65
Sharp	1.90

Screw Calks—

	5-16	%	7-16	¾	%
Blizzard M.	\$18.00	\$18.00	\$20.00	\$20.00	\$22.00
Sure Grip M.	18.00	18.00	20.00	22.00	22.00
BL Diamond M.	18.00	18.00	20.00	22.00	22.00
Red Tip M.	20.00	20.00	22.00	22.00	24.00
Rowe, Jr. M.	18.00	18.00	20.00	20.00	22.00
R. Eg. Ft. M.	20.00	20.00	22.00	22.00	24.00

Plow Lays—

Solid Cast	\$0.8%
Crucible	0.09%
Soft Center	13

Fitted Plow Lays—

Crucible, 12"	\$1.20
Crucible, 18"	1.80
Soft Center, 12"	1.95
Soft Center, 18"	2.60

Hickory Lumber—Per Foot—

1 to 2½	\$.10
2½ to 4½	12

Ash and Oak Lumber—Per Foot—

1 —1½	\$.08
1½—2	08½
2½—3	09
3½—4	10

Yellow Poplar Lumber Per M. Feet—

	6 to 12	13 to 17	18 to 24
%"	\$75.00	\$85.00	\$90.00
¾"	75.00	78.00	90.00
1"	78.00	85.00	95.00
1½"	85.00	90.00	114.00
2"	85.00	90.00	114.00

Rough Hickory Axles—

3 x 4 x 6 ft.	\$.75
3½ x 4½ x 6 ft.	1.00
4 x 5 x 6 ft.	1.30
5 x 6 x 6 ft.	2.40
4 x 5 x 6½ ft.	1.75
4½ x 5½ x 7 ft.	2.30
5 x 6 x 7 ft.	2.80
5 x 7 x 7 ft.	3.40

Finished Hickory Axles—

For 2½ and 2¾ Skeins	\$.95
For 3 Skeins	1.10
For 3½ Skeins	1.35
For 3¾ Skeins	1.50
For 3¾ Skeins	1.80
For 4 Skeins	2.10

Rough Oak Bolsters—

	x 4	x 4½	x 12	x 14	x 16
3 x 4	\$.38	\$.40	\$1.30	\$1.35	\$1.75
4 x 5	80	.70	2.20	2.25	3.00
5 x 6	1.00	1.20			

Finished Oak Bolsters—

2½ x 3½ and under	\$.60
3 x 4	65
3½ x 4½	80

Rough Oak Wagon Tongues—

4 x 4 x 2 x 4 x 12 and smaller	\$1.15
--------------------------------	-------------

Finished Oak Wagon Tongues—

3½ and smaller	\$1.35
3½	1.45
4	1.55

Two-Inch Sawed Hounds

	Per Pair
Tongues	\$.35
Front	40
Hind	50

Wheels—

Barren Patent—white—not tired	50%
Tiring—No. 13 and less	45%
Tiring—No. 17 and larger	30%
Screws 1½" Thread and less	50%
Rivets 1½" Tread and less	40%
Screws or rivets ¾" and heavier	40%
Boring or Boxing less than 10 cents lots	40%
Boring or Boxing 10 sets or more of one size	60%
Priming Wheels, net	25c
Oiling, not tired, set	30c
Allowance of 25c per set on all special tired wheels with three or four piece rims.	
Oiling, not tired, No. 17 to No. 39	25c
Oiling No. 45 and larger	40c

Special Wheel Tired—"E"	Grade	2 piece Rim.
0 ¾ x ¼"	\$6.95	9 1½ x ¼" \$ 9.85
1 ¾ x ¼"	7.20	9 1½ x 5-16" 9.80
8 1 x ¼"	7.65	13 1½ x 5-16" 12.00
8 1 x 5-16"	7.90	13 1½ x ¾" 12.40

Cupped Oak Hubs.

	Plain End Oak Hubs
10 x 14	\$3.80
11 x 14	4.20
11 x 15	4.50
11 x 16	5.10
12 x 16	5.75
12 x 17	6.80
13 x 18	7.00
7 x 8 x 9	\$1.15
7 x 9 x 10	1.25
8 x 9 x 10	1.25
8 x 10 x 11	1.50
9 x 10 x 11	1.69
9 x 11 x 12	1.80
10 x 12 x 13	2.75
11 x 13 x 14	8.90
12 x 14 x 15	4.50

Rough Sawed Fellos—

1½ x 2"	\$1.70
1½ x 2½"	1.90
1½ x 3"	2.00
3 x 3½"	\$5.75
2 x 2½"	\$2.10
2½ x 2"	4.60
3 x 3"	5.60

Ironed Poles, White, XXX—

¾ x 2½" No. 2	\$3.80
2 x 2½" No. 3	3.80

Ironed Shaft, White, XXX—

1½ x 2" and smaller	\$1.95
1½ x 2"	2.20
1½ x 2½"	2.70

Farm Wagon Bows—

Round Top, ½ x 2"	\$.60
Flat Top, ½ x 2"	75
Round Top, ¾ x 2½"	1.35

Standard Size Piano Bodies with Seats—

Each	\$4.25
------	-------------

Plow Beams—

1 Horse	\$.60
2 Horse	75
3 Horse	1.10

Spokes and Rims—

Oak and Hickory Spokes, net on Weiss & Leash List No. 6.	
Finished Rim—XX—¾"	\$1.75
Finished Rims—XX—1"	1.65
Oak Rims—Discounts	40-10%
Hickory Rims	40%

Wagon Neckpoke Woods—

Keller & Tamm's List—Discount	25%
-------------------------------	----------

Wagon Whiffletree Woods—All Grades—

Keller & Tamm's List—Discount	25%
-------------------------------	----------

Oval Plow Doubletrees— Flat Plow Doubletrees—

2½ x 36"	\$1.60
2 x 40"	2.40
1½ x 3½ x 42"	\$2.75

Wagon Evener Woods—

2 x 4 and 2 x 4½—Keller & Tamm's List—Discount	30%
Larger	25%

Buggy Evener Woods—All Grades

Keller & Tamm's List—Discount	25%
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Buggy Whiffletree Woods—

Mixed Second Growth and Second Growth—Keller & Tamm's List—Discount	20%
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Buggy Neckpoke Woods—All Grades

Keller & Tamm's List—Discount	20%
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by putting on this Threlkeld Malleable Iron Standard. Specially designed for wood balusters. Greatly reduces the wear on the side of the box. Note the channel side permits using gas pipe for false standard to give continuous support. Write for circular today.

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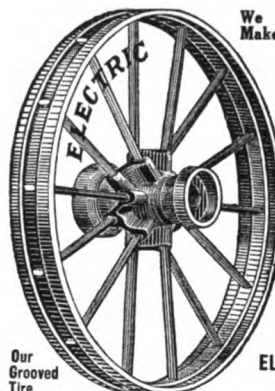
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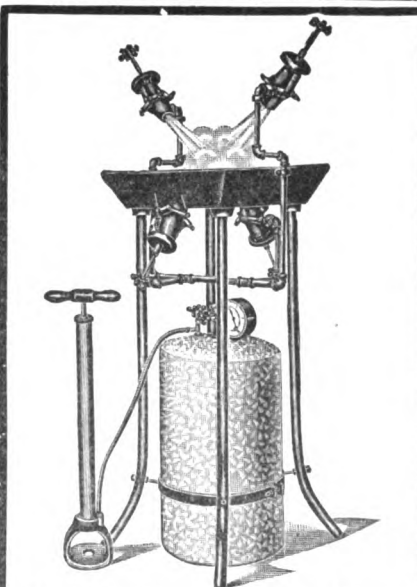
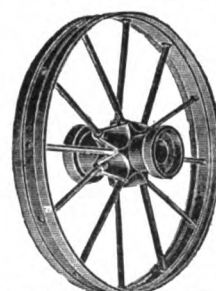
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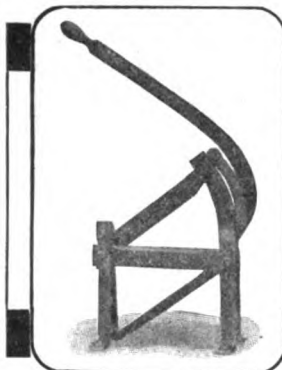
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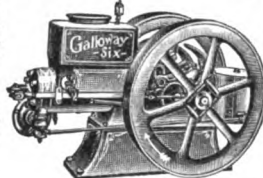
The height of efficiency in engine power! You can't find its superior at any price. Honestly manufactured. An unheard of offer. Simple in design, thorough in construction, perfect in operation and adapted to every purpose, Galloway Masterpiece Engines answer the most exacting demands.

Positively the last word in powerful and economical engine construction. Stands the test of years of hard service, day in and day out. Thousands of testimonials from our customers vouch for this fact. **GUARANTEED FOR FIVE YEARS** and backed by our \$25,000 **GUARANTY BANK BOND.**

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This course is **FREE** for residents of New York State, for those who live outside of the State, there is a tuition of \$25.

Write at once for the details of the course to **Prof. Henry Asmus, N.Y. State Veterinary College, Dept. of Farriery, Ithaca, N. Y.**

This course was established to benefit you. Why not take advantage of it.

TRADE LITERATURE AND NOTES.

Another number of "Forge Fire Facts" has been issued by the Pennsylvania Coal & Coke Corporation. It is quite an unusual booklet in that it was written not by the Pennsylvania Company, but by James Cran. James Cran is a blacksmith who is known to practically every reader of "Our Journal" either on account of his heavy work or his artistic rose forgings.

"How I Solved My Coal Troubles", is the title of the article which James Cran has written to show what he has found out about coal and forge difficulties. In a brief, straightforward, smithy way Mr. Cran explains why he pays so much attention to the coal he uses and tells of the troubles he used to have until he had solved his coal problems. Mr. Cran gives several typical examples of the kind of trouble a smith will run up against in an ordinary day's work and shows how many of the troubles which he blames elsewhere really should be laid to the coal pile.

Then Mr. Cran gives a good many hints on handling the forge fire which are of great value to every smith. There has been some discussion lately as to the value of wetting coal and Mr. Cran explains his views on this subject in a very interesting way showing just what the real value of wetting coal is and when it is good practice. Mr. Cran also takes up the question of a loose or packed fire,

showing when each of these fires should be used. In fact, the book is brimful of helpful suggestions all the way through and to give an example of the practical tips it contains we are going to quote the following paragraph on Mr. Cran's way of testing coal:

"I have found a good way to try out coal is to build a fair sized loose fire, turn on a light blast for from one-half to three quarters of an hour and then shut off the blast and allow the fire to die out gradually. By doing this, whatever impurities it may contain will solidify in the shape of clinker at the bottom of the fire. Then when the blast is shut off, whatever ash forms will settle and can be examined. Any slaty or stony matter can be detected and a good idea of the coal's coking qualities can be had."

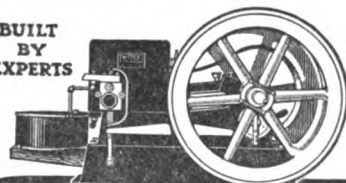
Considering that this book is free there is no reason why the helpful information

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The Editor is W. O. Bernhardt, Buffalo, N. Y.; the Business Manager, A. W. Bayard, Buffalo, N. Y.; Publisher, The W. F. Wendt Publishing Company, Buffalo, N. Y.

The owners are W. F. Wendt Pub. Co., William F. Wendt, C. H. Schwenk and A. W. Bayard, all of Buffalo, N. Y.

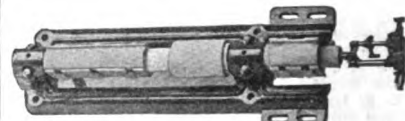
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Signed—A. W. Bayard, Business Manager.

Sworn to and subscribed before me this 28th day of March, 1916.

(Seal) HERBERT S. WHITING,
Notary Public.

For the Wagon Woodworker



SHERWOOD'S No. 88

Easily mounted on a simple wood table. It will plane, joint, chamfer, bore holes and sand the wood work. For new or repair work. Does it with neatness and dispatch, and it is right on the job, ready at your bidding.

Write for Catalogue No. 12 containing valuable information for the Blacksmith.

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Horse Shoe Bar Iron

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The Milton Mfg.
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Is of Superior Strength
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it contains should not be at the disposal of every smith. Whether or not you have a copy of the first number of "Forge Fire Facts", The Pennsylvania Coal & Coke Corporation will be glad to send you a copy of this second edition which has been written by Mr. Cran. The advertisement of the Pennsylvania Coal & Coke Corporation in this issue contains a handy coupon which will bring the book to you. Such practical information is not given away very often these days and every reader who sends in the coupon will be glad indeed to receive this helpful book.



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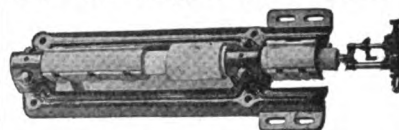


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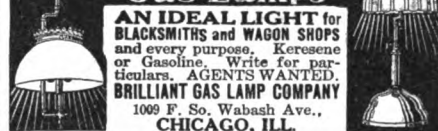
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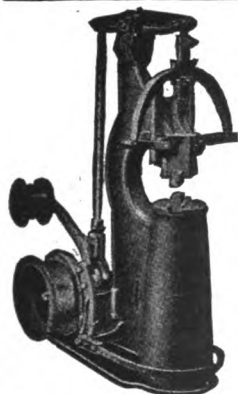
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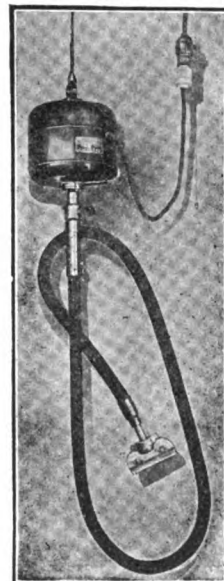
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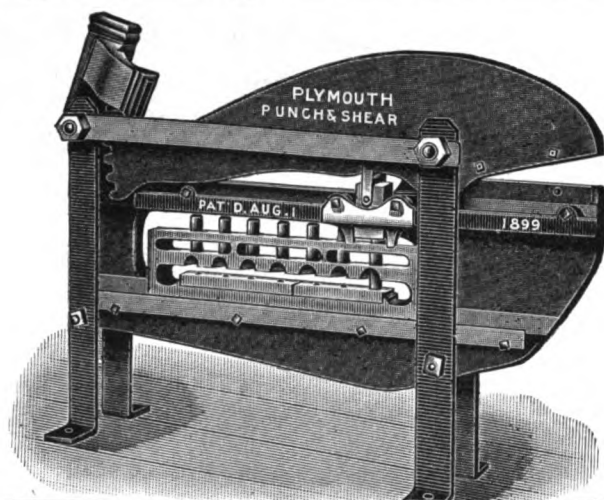
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TRADE LITERATURE AND NOTES.



Edward A. Burns of Hartford, Connecticut, who was the Superintendent of The Rowe Calk Company's factory from 1907 up to 1915 and who since that time has been with the Atlantic Screw Company of Hartford, Connecticut, has now returned to the new factory of The Rowe Calk Company at Plantsville, Connecticut, in his former position as superintendent.

Mr. Burns is the pioneer manufacturer of welded tool steel center calks by the cold heading process and was responsible

for the development of the present-day Rowe hard center calk sold under the brand names of Ring-Point and Rowe Junior.



The Rowe Calk Company has appointed a General Inspector of its manufacturing operations, its finished product and of all horseshoes, who will be in continuous attendance at all times at its factory in Plantsville, Connecticut.

William A. King of Hartford, Connecticut, is the Inspector General. Mr. King is

"DUPLEX" BOLT DIE STOCK SETS.

They contain dies that adjust without a wrench and require no reversing after cutting.

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Patent Applied For

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Isn't such a bridle worth \$1.50 to you in your business? Can't you see where it will prove a business producer for you? It is made of the very best of material and is guaranteed for ten years. Send \$1.50 for it today, sent postpaid right to your door. If you like it, keep it; if you don't, send it back and I'll return your money.

Prof. Jesse Beery, Dept. 409, Pleasant Hill, Ohio

known throughout the country among horsehoers and horse owners and has a reputation going back a great many years.

For years, Mr. King was the official shoer of the famous Charter Oak Racing Park, and in this connection acquired much of his reputation throughout the country. He was also for several years the President of the Master Horseshoers' Protective Association, and was at one time offered a place upon the board of the National Association.

NEW BOOKS

Oxy-Acetylene Welding and Cutting, by Harold P. Manley. Over 200 pages, well illustrated, cloth bound. Price, \$1.50.

This book covers not only the subject of oxy-acetylene welding and cutting, but also includes chapters on electric, forge and thermit welding. The subject of oxy-acetylene welding is covered thoroughly, beginning with the discussing of metals and alloy and heat treatment, it goes into the matter of welding materials, acetylene generators and very thoroughly into the subject of oxy-acetylene practice, including the preparation of the work, control of the flame and torch, how various metals and alloys are welded.

The chapters on electric welding include an explanation of the resistance method of welding with the electric current; butt, spot and tap welding; also explains the electric arc method. The chapter on hand forging and welding goes into the details of forging and blacksmithing. A chapter on soldering, brazing and thermit welding

(Continued on Page 44.)

**CURRENT HEAVY HARDWARE PRICES.**

The following quotations are the lowest prices generally prevailing April 18, 1916. They are subject to change without notice, and higher prices are charged according to quality, specification and other conditions.

Iron and steel have taken another stride forward—these items are now \$3.80 at Chicago, and from that all the way to \$3.60 according to freight differential.

The horseshoe manufacturers have also advanced the prices on their product, which it will be noted, are now listed at \$5.00. Anvil prices have advanced to 13½ cents for the Plain and 14½ for the Clip Horn. Horse nails are quoted as follows: Union, \$3.25; Star, \$3.75; Leader, \$2.75.

Further advances are expected, as the end has not yet been reached. Business seems to be universally good with continued tendency toward still greater prosperity. Collections are good.

Horse Shoes—	
All Iron Shoes	\$5.00
Steel Shoes	5.00
No. 0 and No. 1, 25c extra. 15c. per keg additional charged for packing more than one size in a keg.	
Mule Shoes—	
X. L. Steel Shoes	
Counterunk Steel Shoes	
Tip Shoes	
Goodenough, heavy	
Goodenough, sharp	
Toe Weight	
Side Weight	
R. E. Light Steel	
Steel Driving	
O. O. Mule Shoes, extra	

Anvils

Merchant Bar Iron—
extra for broken bundles.

\$3.80 rates, full extras, and 20 cents per 100 pounds

Steel Bars—
\$3.80 rates, full extras.

Toe Calks—	Per Box
Blunt	\$1.65
Sharp	1.90

Screw Calks—	5-16	%	7-16	1/4	%
Blizzard M.	\$18.00	\$18.00	\$20.00	\$20.00	\$22.00
Sure Grip M.	18.00	18.00	20.00	22.00	22.00
Bl. Diamond M.	18.00	18.00	20.00	22.00	22.00
Red Tip M.	20.00	20.00	22.00	22.00	24.00
Rowe, Jr. M.	18.00	18.00	20.00	20.00	22.00
R. Rg. Pt. M.	30.00	30.00	22.00	22.00	24.00

Plow Lays—	
Solid Cast	\$.08%
Crucible	.09%
Soft Center	.13

Fitted Plow Lays—	
Crucible, 12"	\$1.20
Crucible, 18"	1.80
Softer Center, 12"	1.95
Soft Center, 18"	2.60

Hickory Lumber—Per Foot—	
1 to 2½	\$.10
2½ to 4½	.12

Ash and Oak Lumber—Per Foot—	
1 —1½	\$.08
1½ —2	.08½
2 —2½	.10

Yellow Popular Lumber Per M. Feet—	6 to 12	13 to 17	18 to 24
¾"	\$75.00	\$75.00	\$85.00
¾"	75.00	78.00	90.00
¾"	78.00	85.00	95.00
¾"	85.00	90.00	114.00
¾"	85.00	90.00	114.00

Rough Hickory Axles—	
3 x 4 x 6 ft.	\$.75
3½ x 4½ x 6 ft.	1.00
4 x 5 x 6 ft.	1.30
5 x 6 x 6 ft.	2.40
4 x 5 x 6½ ft.	1.75
4½ x 5½ x 7 ft.	2.30
5 x 6 x 7 ft.	2.80
5 x 7 x 7 ft.	3.40

Finished Hickory Axles—	
For 3½ and 3¾ Skeins	\$.95
For 3 Skeins	1.10
For 3½ Skeins	1.35
For 3¾ Skeins	1.50
For 3 Skeins	1.80
For 4 Skeins	2.10

Rough Oak Bolsters—	3 x 4	4 x 4	5 x 12	5 x 14	5 x 16
3 x 4	\$.36	\$.40	\$1.30	\$1.35	\$1.75
4 x 5	.60	.70	2.20	2.25	3.00
5 x 6	1.00	1.20			

Finished Oak Bolsters—	
3½ x 8½ and under	\$.60
3 x 4	.65
3½ x 4	.80

Rough Oak Wagon Tongues—	
4 x 4 3 x 4 x 12 and smaller	\$1.15

Finished Oak Wagon Tongues—	
3½ and smaller	\$1.85
3½	1.45
4	1.55

Two-Inch Sawed Hounds	Per Pair
Tongues	\$.35
Front	.40
Hind	.50

Wheels—	
Sarven Patent—white—not tired	50%
Tiring—No. 13 and less	45%
Tiring—No. 17 and larger	30%
Screws 1½" Thread and less	50%
Rivets 1½" Thread and less	40%
Screws or rivets ½" and heavier	40%
Boring or Boxing less than 10 cents lots	40%
Boring or Boxing 10 sets or more of one size	60%
Priming Wheels, net	25c
Oiling, not tired, net	20c
Allowance of 25c per set on all special tired wheels with three or four piece rims.	
Oiling, not tired, No. 17 to No. 39	25c
Oiling No. 45 and larger	40c

Special Wheel Tired—"E"			Grade	2 piece Rim.
0	¾ x ¼"	\$6.95	9	1½ x ¼" \$ 9.35
1	¾ x ¼"	7.30	9	1½ x 5-16 9.80
2	1 x ¼"	7.65	12	1½ x 5-16" 12.00
3	1 x 5-16"	7.90	12	1½ x ¾" 12.40

Cupped Oak Hubs.	Plain End Oak Hubs
10 x 14	\$3.30
11 x 14	4.20
11 x 15	4.50
11 x 16	5.10
12 x 16	5.75
12 x 17	6.20
13 x 18	7.00
7 x 8 x 9	\$1.15
7 x 9 x 10	1.25
8 x 9 x 10	1.35
8 x 10 x 11	1.50
9 x 10 x 11	1.69
9 x 11 x 12	1.80
10 x 12 x 13	2.75
11 x 13 x 14	3.90
12 x 14 x 15	4.50

Rough Sawed Fellos—	
1½ x 2"	\$1.70
1½ x 2½"	1.80
1½ x 3"	2.00
2 x 3½"	\$5.75

Ironed Pales, White, XXX—	
¾ x 2½" No. 2	\$3.80
2 x 2½" No. 3	3.80

Ironed Shaft, White, XXX—	
1½ x 2" and smaller	\$1.95
1½ x 2"	2.20
1½ x 2½"	2.70

Farm Wagon Bows—	
Round Top, ½ x 2"	\$.60
Flat Top, ½ x 2"	.75
Round Top, ¾ x 2½"	1.35

Standard Size Piano Bodies with Seats—	
Each	\$4.25

Plow Beams—	
1 Horse	\$.60
2 Horse	.75
3 Horse	1.10

Spokes and Rims—	
Oak and Hickory Spokes, net on Weiss & Leach List No. 6.	
Finished Rim—XX—¾"	\$1.75
Finished Rims—XX—1"	1.65
Oak Rims—Discounts	40-10%
Hickory Rims	40%

Wagon Neckyoke Woods—	
Keller & Tamm's List—Discount	25%

Wagon Whiffletree Woods—All Grades—	
Keller & Tamm's List—Discount	25%

Oval Plow Doubletrees—	Flat Plow Doubletrees—
2½ x 36"	\$1.60
2 x 40"	2.40
1½ x 3½ x 42"	\$2.75

Wagon Evener Woods—	
2 x 4 and 2 x 4½—Keller & Tamm's List—Discount	30%
Larger	25%

Buggy Evener Woods—All Grades	
Keller & Tamm's List—Discount	25%

Buggy Whiffletree Woods—	
Mixed Second Growth and Second Growth—Keller & Tamm's List—Discount	20%

Buggy Neckyoke Woods—All Grades	
Keller & Tamm's List—Discount	20%



DON'T FORGET THIS FACT

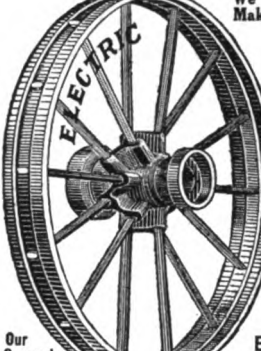
You will receive better pay for your repair work when you use **STAR STEEL SHAPES**

The "Triple Merit" Line—Soft Center, Solid Cast, Crucible Steel.

Look For The STAR When You Order

Plowshares, Listershares, Moldboards, Plow Points, Seeder Points, Cultivator Shovels, Land-side Plates, Land-side Points, Shovel Points, Drill Points, Subsoilers.

STAR MFG. COMPANY, Carpentersville, Ill.



STEEL WHEELS

To Fit Any Axle Plain or Grooved Tire

Steel or Hickory Axles

Any Size

A Full Line of Wood and Steel Farm Trucks

With Steel or Wood Wheels

Write for Large Catalog and Prices

ELECTRIC WHEEL CO.

Box A, Quincy, Ill.



EMPIRE STEEL WHEELS

Plain or Grooved Tire

To Fit Any Wagon

Farm Trucks

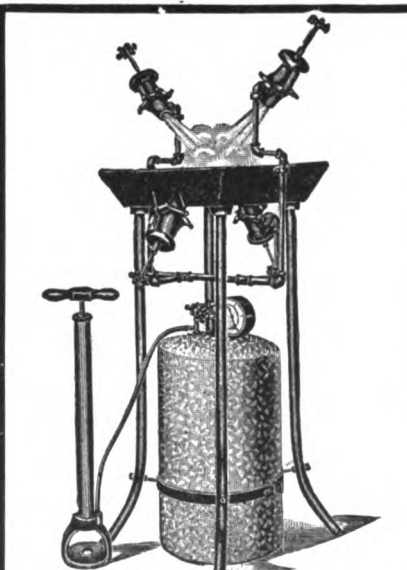
All Standard Types

Write today for Proposition to Blacksmiths.

Empire Mfg. Co.

P. O. Box 306

QUINCY, ILLINOIS



Best Gasoline Brazing Forge

IN THE WORLD

Thousands sold in last ten years. Four sizes.

Send for Catalog.

The National Cement and Rubber Co.

308 S. St. Clair Street Toledo, Ohio, U. S. A.

Improve Your Wagon Work

by putting on this Threlkeld Malleable Iron Standard. Specially designed for wood balsters. Greatly reduces the wear on the side of the box. Note the channel side permits using gas pipe for false standard to give continuous support. Write for circular today.

DONELSON MFG. CO., Chariton, Iowa.

"GEARS AND WAGONS"

Selle Gears

A quarter of a century of success has placed "Selle Gears" and Wagons in the hands of the largest wagon users in the world.

Express and Transfer Companies, Department Stores, Fire Departments, etc.; specify "Selle Gears" and will take no other after once tried.

230 page catalog free

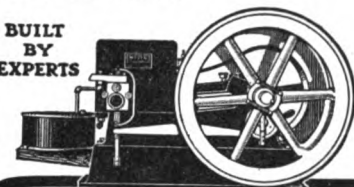
THE AKRON-SELLE CO. Akron, Ohio

DOWN AGAIN!

GO WITTE PRICES

2 H-P, \$29.95; 3 H-P, \$47.85; 4 H-P, \$64.75;
6 H-P, \$89.90; 8 H-P, \$129.80. Write for prices
on 12, 16 and 22 H-P.

BUILT
BY
EXPERTS



You can't buy so good an engine at the same price. You can't buy a better engine at double the price. Lower fuel expense. Simple in construction. Easily started. 30 to 50 per cent surplus power. 90 day trial offer. Sold direct, factory to user. Established 1870.
Write for free book, "How to Judge Engines," and for price list of all sizes and styles, Kerosene, Gasoline, Distillate, Naphtha and Gas.
ED. H. WITTE, WITTE ENGINE WORKS,
1768 Oakland Avenue, Kansas City, Mo.
1768 Empire Bldg., Pittsburgh, Pa.

TRADE LITERATURE AND NOTES.

(Continued from Page 42.)

is also included and should interest a great many blacksmiths. The last chapter is a short one on the subject of the oxygen process for the removal of carbon from automobile cylinders. An index makes the book complete and handy for every reference.

Modern Starting, Lighting, and Ignition Systems, by Victor W. Page, M. E., 500 pages, 250 specially made engravings, folding plates. Norman Henley Publishing Company, New York. Price, \$1.50.

This book covers the subject of starting, lighting and ignition systems very thoroughly, including the latest developments in these branches of automobile practice. All the leading systems of starting, lighting and ignition systems are described and illustrated. The diagrams are shown in both technical and non-technical forms. This volume starts with a chapter on elementary electricity, and the chapters are so arranged that all of the subjects treated can be understood by anyone, as elementary electric principles are considered before any attempt is made to discuss the features of the various systems. It is an excellent book for the automobile repairman as it considers and treats on just the subjects he will need to know about in his repair work.

A free supplement in two colors is announced by the publisher of Dyke's Automobile Encyclopedia. This supplement treats on the construction, principle and operation, care and adjustment of the Packard Twin Six, King Eight, Willys-Knight and the Ford and Maxwell cars. This supplement is included free of cost with all orders for Dyke's New Automobile Encyclopedia. The price of the encyclopedia is \$3.00.

Location of Cooling and Lubrication System Faults. This is an illustrated chart which shows a typical automobile power plant using a pump for circulating the cooling water and shows at a glance how overheating and loss of power due to faulty action in the lubricating and cooling systems may be remedied. The size of this chart is 24 by 38 inches and the price is 25 cents. Norman Henley Pub. Co., New York.

For the blacksmith who is interested in the opportunities offered by modern auto-

Horse Shoe Bar Iron

MADE BY

The Milton Mfg.
Company
MILTON, PENN'A

Is of Superior Strength
and Quality. We can prove
it. Write us.

mobile repairing the catalog of The Greer College of Motoring will prove a book well worth having. Included in this catalog is an instructive article, "How to Drive a Gasoline Automobile", by Irwin Greer, and a great deal of other valuable information that the blacksmith would be glad to review.

The catalog also explains the Greer system of personal instruction and gives an adequate idea of the methods of The Greer College of Motoring. A free copy of this catalog will be sent to every reader of THE AMERICAN BLACKSMITH who writes to The Greer College of Motoring, 1519-1521 Wabash Ave., Chicago, Ill.

Replacing auto tops is coming to be a very profitable line of work for the Blacksmith. The advertisement of the Auto Specialty Factory, makers of "E. Z. On" top coverings, in this issue illustrates the favorable proposition available for the Blacksmith. Not only is this work quite profitable but it is much more pleasant and attractive than some of the harder tasks of Smithing.

When the top is worn out, as a rule, the frame is still in good condition. Instead of taking off the top, crating and shipping it to some factory to have the covering replaced, the Auto Specialty Factory furnishes a special measuring blank which the Smith can fill out within ten minutes and obtain a covering to fit every make of car.

This covering can be attached in about one-third the time it requires to put on a set of seat covers. The Auto Specialty Factory now have measurements for more than a hundred different makes of cars. By using their special chart a covering can be furnished to fit any car that was ever made.

The Smith who adopts this proposition is in a very favorable position to serve his customers and save them a great deal of money when the cost of an entirely new top is considered. The top coverings can be sent cheaply by either parcels post or express. When they arrive they are al-



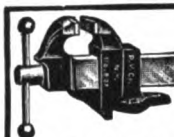
SELDOM SEE

a big knee like this, but your horse may have a bunch or bruise on his Ankle, Hock, Stifle, Knee or Throat.

ABSORBINE

TRADE MARK REG. U.S. PAT. OFF.

will clean it off without laying the horse up. No blister, no hair gone. Concentrated—only a few drops required at an application. \$2 per bottle delivered. Describe your case for special instructions and Book 8 K free. ABSORBINE, JR., antiseptic liniment for mankind. Reduces Painful Swellings, Enlarged Glands, Goitre, Wens, Bruises, Varicose Veins, Varicosities, Old Sores. Allays Pain. Price \$1 and \$2 a bottle at druggists or delivered. Manufactured only by W. F. YOUNG, P. D. F., 230 Temple St., Springfield, Mass.



Prentiss Patent Vises

BEST MADE

Large Illustrated Catalog Free

Prentiss Vise Co., Hardware Bld., New York

Harvey Boltless Auto Springs

Are guaranteed from end to end. Sizes for all leading makes and models of cars carried in stock and at all leading jobbing centers. Write for Size Book, price list and name of your nearest jobber.

HARVEY Box 31 SPRING CO. Racine, Wis.

ready completely finished and all the Smith has to do is to draw them on the frame and tack in place.

Exclusive agents are being appointed in each section and every Blacksmith who would like to have the details of the proposition will find it worth while to write to the Auto Specialty Factory, Cincinnati, Ohio, and mention THE AMERICAN BLACKSMITH.

Absorbine, the liniment which has been advertised in "Our Journal" for some time, is used quite extensively by drivers and trainers. They find it a valuable aid in developing first-class race horses and getting them into necessary condition, as well as keeping them strong and sound throughout the season.

Absorbine has become a popular liniment because it not only is effective but does its work in a mild, soothing manner without blistering or laying up the horse. For complete details about Absorbine, write to W. F. Young, P. D. F., 230 Temple St., Springfield, Mass., mentioning THE AMERICAN BLACKSMITH.

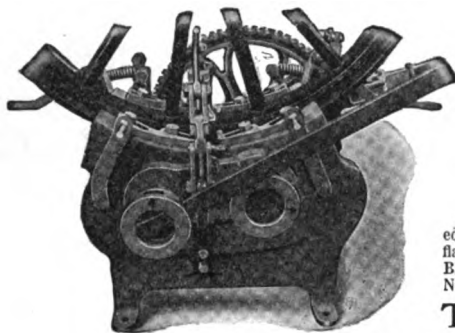
In the advertisement of the Wm. Galloway Company, an offer is made to send a free copy of the 1916 Galloway catalog. This is a work containing two hundred and fifty pages and is made up of valuable information for every engine user or shop owner who contemplates using engine power.

In the catalog six plans are explained whereby the shop owner can have a Galloway engine for ninety days' free trial. Copy of this catalog can be obtained by addressing William Galloway, President, The William Galloway Company, 925 Galloway Station, Waterloo, Iowa.

During the New York and Chicago Automobile Shows the New Era Spring & Specialty Company of Detroit, Michigan, gave an interesting demonstration of the durability of a New Era "BETTER" Spring under extreme stress and test.

A special machine was devised, of a single cylinder motor having a stationary

(Continued on Page 46.)



The Brooks Cold Tire Setters

Set tires cold while on the wheel. Will do a week's work in a day's time, and do it better than can be done the old way. The greatest trade builders and money makers that can be placed in a shop. Every bearing is machine finished. The heads have a circular movement which prevents straightening or flattening or kinking the tire where it is upset. Used by thousands of blacksmiths. The only cold tire setter in use and endorsed by the United States Government. We manufacture both Hydraulic and lever cold tire setters.

We are also manufacturers of the latest improved Oxy-Acetylene Welding Machines and Acetylene Generators, equipped with our famous Flash Back Safety Valve. No possible danger of an explosion or bad results from a flash back. We also build Welding Outfits to be used with cylinder compressed gas. Nothing better than the BROOKS. Our products are all fully guaranteed. Drop us a card and we will send you our booklets. DO IT NOW before you forget it.

THE BROOKS MACHINE CO., Wichita, Kansas, U. S. A.

The Perfect Power Hammer



The Simplest
in Construction
The Most
Effective in
Operation
The Most
Durable and
THE BEST

MADE IN TWO
SIZES:

3 inch square, 40 lb.
ram — shipping
weight, 1,100 lbs.

4 inch square, 80 lb.
ram — shipping
weight, 1,800 lbs.

Write any jobber
for Prices, or

**MACGOWAN & FINIGAN
FOUNDRY & MACHINE CO.**
204 North Third Street
ST. LOUIS, MO.

Butcher Knives Made for Blacksmiths



Stamped With Your Own Name in \$5.00 Assortments.
We sell by mail only, and to only one smith in each town.
Every knife warranted. Write for information and send for
catalog. **WOODWORTH KNIFE WORKS, Hudson, N. Y.**

Pat. Oct. 19, 1909.

Use These Self Sharpening Toe Calks

Ludvigsen Bros. Welded Steel Center Calks are the choice of MANY horseshoers because they always give satisfaction.

THE HARD STEEL PLATE in the center and the two outside plates are welded together and shaped to a sharp calk that stays SHARP while it WEARS DOWN.

Sizes, 0 to 6.

We will gladly mail a sample of this calk to any reader of The American Blacksmith on request. **BE SURE TO TELL YOUR JOBBER you want LUDVIGSEN BROS. WELDED STEEL CENTER TOE CALKS.**

LUDVIGSEN BROS.,
JACKSON, MINN.,
or 47 Second St., MILWAUKEE, WIS.

"NEW
EASY"
THE
GENUINE
TOOL

4 Sizes

BOLT CLIPPERS

"EASY" 2 Sizes



KNOWN AND
PREFERRED
EVERYWHERE

H. K. PORTER

EVERETT, MASS.

U. S. A.

EVER-READY BLANK SHARE

THE
BLACKSMITH'S
FAVORITE

Can be fitted to
more styles of
plows than can
any other pattern.



To save labor
use our Fitted
Shares for all
makes of plows.

Write for Catalog

CRESCENT FORGE & SHOVEL COMPANY

MANUFACTURERS OF HIGH GRADE
FLOWSHARES AND BLACKSMITHS' BLANKS

HAVANA, ILL., U. S. A.

"Bay State" Carriage and Tire Bolt Ratchet Wrenches

Labor
Savers!
Money
Savers!



Three Sizes
Take Hex and
Square Nuts

GEO. A. CUTTER, Sales Agent, Taunton, Mass.

Ask Your Dealer

THE HORSE RASP OF QUALITY



Ask your dealer for the IMPROVED HELLER RASP with keen cutting hard teeth. Made in all patterns and cuts, "Slim," "Light," "Slim Light," and "Fine Cut." Insist on getting the size, kind and cut best suited for your work. It will pay you to give them a trial. New catalogue mailed free on application.

ESTABLISHED IN 1836

HELLER BROTHERS COMPANY

NEWARK, N. J.

JUST WHAT YOUR SHOP NEEDS

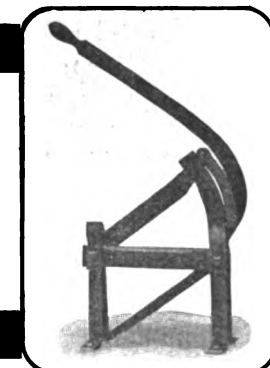
Save 75% of the Time and Over 50% of the Hard Work
connected with your hot cutting jobs by the use of a

Simonsen Hot Trimmer

It is an actual fact that with this shear you not only save time and hard work which will add much to your profits during the season, but many of the jobs you now hate will become a pleasure to you when you find how you can do them so easily and with such added profits.

Ask your jobber—or write us mentioning his name. Our circular B, showing several styles of shears, is free.

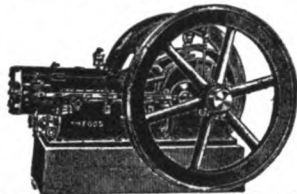
SIMONSEN IRON WORKS, SIOUX RAPIDS, IOWA, U. S. A.
Exporters: Henry W. Peabody & Co., New York, N. Y.



THE FOOS

KEROSENE, GASOLINE OR GAS

Any size required for blacksmith shop, industrial service, farming, electric lighting or water-works.



Catalog 49 shows the Type J Engine, suitable for blacksmiths, contractors, farm work, etc.

THE FOOS GAS ENGINE CO. SPRINGFIELD, OHIO

Never Accept Imitations

When a dealer or jobber tries to impose substitutes for the *good advertised articles*, write us or the manufacturer. We will see that you get the genuine—what you want.

FOR YOUR LETTER-HEADS



A good letter-head is always better with the addition of a good illustration.

What better subject can you choose than the horse's head—what better head than the one shown here. We can supply cuts of this beautiful horse's head

at 80 cents each. Use it on your letter-heads, bill-heads, envelopes, circulars, and all of your printed matter. Neat printed matter means more business for you. Send for a cut of this beautiful head today, and use it on your next batch of printing. Check, money order, stamps or registered letter will do.

AMERICAN BLACKSMITH COMPANY

P. O. Box 974

BUFFALO

N. Y., U. S. A.

TRADE LITERATURE AND NOTES.

(Continued from Page 44.)

arm bolted to the top of the piston, which arm was clamped to a spring the same as if clamping to an axle. This piston had a four-inch stroke. The spring was held stationary at both ends and the spring was pushed up to one-fourth inch above a straight line over one hundred revolutions per minute, averaging six thousand per hour for ten hours daily throughout the show.

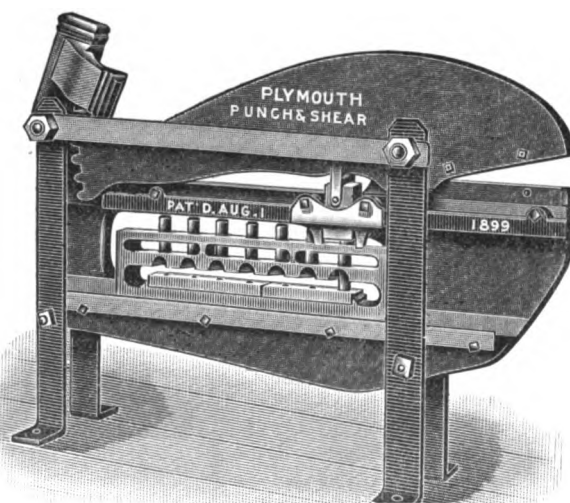
While the average spring of ordinary carbon steel, not heat treated, will withstand about seventy-five to one hundred thousand vibrations, a New Era "BETTER" Spring at the Chicago Show made 463,224 vibrations before it broke Saturday noon.

The New Era Company offers a full set of New Era "BETTER" Springs to the person guessing the nearest number of vibrations before breakage, or, if not broken during the week the one guessing the nearest total number of vibrations during the show period. Thousands of guesses were recorded by interested persons who saw this severe test and the winner, Mr. Frank Fillman of Gardner, Ill., made the nearest guess of 461,200.

One of the interesting advertisements appearing in this issue is that of the Plymouth Foundry & Machine Co., Plymouth, Wis., manufacturers of the Plymouth Punch and Shear. A representative of "Our Journal" has called at this firm's factory and they are excellently equipped to make a punch and shear that will give

great satisfaction to shop owners.

The manufacturers of this punch and shear mention to us that they guarantee that the machine will do what is claimed for it in their advertisement. Any reader or THE AMERICAN BLACKSMITH interested in purchasing a combined punch and shear can secure information about the Plymouth



from his supply house or by writing direct to the above company. They will gladly send circulars completely describing their machine.

In the Chicago Tribune's society columns, this item recently appeared: "You have to be very imaginative to guess what is the favorite sport at Palm Beach these days. It's the bicycle. If that isn't returning to

primeval things! The whole place, young and old, goes in for a swim about 11 o'clock and plays around until luncheon time on the beach. And after that it's golf, tennis—then BICYCLING, and everybody's having a superb time and staying much longer than they expected to."

The pendulum of favor has for several years been swinging back to bicycling as a sport. The sporting pages of almost every newspaper is giving space to the six-day bicycle races, which have been held in increasing numbers this winter, and performing to huge crowds.

Outdoor racing has also been revived to a considerable extent. Over a hundred riders participated in a recent Chicago race, although the roads and weather were anything but favorable.

Aside from its value as a recreation and a diversion, bicycle riding never has lost its favor with thousands upon thousands of factory workers, and others who use it as the one best solution of the daily transportation problem—it has constantly grown in popularity with the younger

generation, and most of the wide-awake boys of today who cannot urge their parents into buying a bicycle get busy and earn the money themselves.

There is a constant fund of suggestions for the man or boy who owns a bicycle or who is interested in getting one, in the catalog of The Mead Cycle Co. Mail your requests to them. Address to Dept. G229, Chicago, Ill.

**CURRENT HEAVY HARDWARE PRICES.**

The following quotations are the lowest prices generally prevailing June 18, 1916. They are subject to change without notice, and higher prices are charged according to quality, specification and other conditions.

There is no change in Current Heavy Hardware Prices this month, the \$3.30 rates still applying. The demand for both iron and steel seems to show no decrease. Mills continue to produce the greatest outputs they have ever known and are still much behind in their orders.

Business continues generally good, through the heavy rains in some sections are retarding trade and holding back the demand usual at this season.

Collection are reported better.

Horse Shoes—

All Iron Shoes	\$5.00
Steel Shoes	5.00
No. 0 and No. 1, 25 cents extra. 15 cents per keg additional charged for packing more than one size in a keg.	
Mule Shoes	
X. L. Steel Shoes	
Countersunk Steel Shoes	
Tip Shoes	
Goodenough, heavy	
Goodenough, sharp	
Toe Weight	
Side Weight	
E. E. Light Steel	
Steel Driving	
O. O. Mule Shoes, extra	

Anvils12½**Merchant Bar Iron—**

\$3.30 rates, full extras, and 20 cents per 100 pounds extra for broken bundles.

Steel Bars—

\$3.30 rates, full extras.

Toe Calks—

Blunt	Per Box
Sharp	\$1.85

Screws Calks—

	5-16	¾	7-16	½	¾
Blizzard M.	\$18.00	\$18.00	\$20.00	\$20.00	\$22.00
Sure Grip M.	18.00	18.00	20.00	22.00	22.00
Bl. Diamond M.	18.00	18.00	20.00	22.00	22.00
Red Tip M.	20.00	20.00	22.00	22.00	24.00
Rowe, Jr. M.	18.00	18.00	20.00	20.00	22.00
R. Eg. Pt. M.	20.00	20.00	22.00	22.00	24.00

Plow Lays—

Solid Cast	\$.08%
Crucible	\$.09%
Soft Center	.13

Fitted Plow Lays—

Crucible, 12"	\$1.20
Crucible, 18"	1.80
Softer Center, 12"	1.95
Soft Center, 18"	2.60

Hickory Lumber—Per Foot—

1 to 2½	\$.10
1½ to 4½	.12

Ash and Oak Lumber—Per Foot—

1 —1¼	\$.08	2½—3	\$.09
1½—2	.08½	3½—4	.10

Yellow Poplar Lumber Per M. Feet—

	6 to 12	13 to 17	18 to 24
¾"	\$75.00	\$85.00	\$85.00
1"	75.00	78.00	90.00
1½"	78.00	85.00	95.00
2"	85.00	90.00	114.00
2½"	85.00	90.00	114.00

Rough Hickory Axles—

3 x 4 x 6 ft.	\$.75
3½ x 4½ x 6 ft.	1.00
4 x 5 x 6 ft.	1.30
5 x 6 x 6 ft.	2.40
4 x 5 x 6½ ft.	1.75
4½ x 5½ x 7 ft.	2.30
5 x 6 x 7 ft.	2.80
5 x 7 x 7 ft.	3.40

Finished Hickory Axles

For 2½ and 2¾ Skeins	\$.95
For 3 Skeins	1.10
For 3¼ Skeins	1.35
For 3½ Skeins	1.50
For 3¾ Skeins	1.80
For 4 Skeins	2.10

Rough Oak Bolsters—

	¾	1¼	1½	1¾	2
3 x 4	\$.38	\$.40	\$1.30	\$1.35	\$1.75
4 x 5	.60	.70	2.20	2.25	3.00
5 x 6	1.00	1.20			

Finished Oak Bolsters—

2½ x 3½ and under	60c
3 x 4	65c
3½ x 4½	80c

Rough Oak Wagon Tongues—

4 x 4, 2 x 4 12 and smaller	\$1.15
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Finished Oak Wagon Tongues—

3½ and smaller	\$1.35
3¾	1.45
4	1.55

Two-Inch Sawed Hounds—

	Per Pair
Tongues	35c
Front	40c
Hind	50c

Wheels—

Sharpen Patent—white—not tired	50%
Tiring—No. 13 and larger	45%
Tiring—No. 17 and larger	80%
Screws 1½" Thread and less	50%
Rivets 1½" Thread and less	40%
Screws or rivets ½" and heavier	40%
Boring or Boxing less than 10 cents lots	40%
Boring or Boxing 10 sets or more of one size	60%
Priming Wheels, net	25c
Oiling, not tired, set	20c
Allowance of 25 cents per set on all special tired wheels with three or four piece rims.	
Oiling, not tired, No. 17 to No. 39	25c
Oiling No. 45 and larger	40c

Special Wheel Tired—"E"

	Grade 8 piece Rim—
0 ¾ x ¼"	\$6.95
1 ¾ x ¼"	7.20
3 1 x ¼"	7.65
3 1 x 5-16"	7.90
9 1½ x ¼"	\$ 8.35
9 1½ x 5-16"	8.80
13 1½ x 5-16"	12.00
13 1½ x ¾"	12.40

Cupped Oak Hubs—

	Plain End Oak Hubs—
10 x 14	\$3.30
11 x 14	4.20
11 x 15	4.50
11 x 16	5.10
12 x 16	5.75
12 x 17	6.30
13 x 18	6.00
7 x 8 x 9	\$1.15
7 x 9 x 10	1.25
8 x 9 x 10	1.25
8 x 10 x 11	1.50
9 x 10 x 11	1.69
9 x 11 x 12	1.80
10 x 12 x 13	2.75
11 x 13 x 14	3.90
12 x 14 x 15	4.50

Rough Sawed Fellos—

1½ x 2"	\$1.70
1¾ x 2½"	1.90
1¾ x 3"	2.00
3 x 3½	\$5.75
2 x 2½"	\$2.10
2½ x 2"	4.60
3 x 3"	5.60

Ironed Poles, White, XXX

¾ x 2½" No. 2	\$3.80
2 x 2½" No. 3	3.80

Ironed Shaft, White, XXX—

1½ x 2" and smaller	\$1.95
1½ x 2"	2.20
1½ x 2½"	2.70

Farm Wagon Bows—

Round Top, ½ x 2"	\$.60
Flat Top, ½ x 2"	.75
Round Top, ¾ x 2½"	1.35

Standard Size Piano Bodies with Seats—

Each	\$4.25
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Plow Beams—

1 Horse	\$.60
2 Horse	.75
3 Horse	1.10

Spokes and Rims—

Oak and Hickory Spokes, net on Weiss & Lesh List No. 6.	
Finished Rims—XX—¾"	\$1.75
Finished Rims—XX—1"	1.65
Oak Rims—Discounts	40-10%
Hickory Rims	40%

Wagon Neck yoke Woods—

Keller & Tamm's List—Discount	25%
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Wagon Whiffletree Woods—All Grades—

Keller & Tamm's List—Discount	25%
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Oval Plow Doubletrees—

2½ x 36"	\$1.60
2 x 40"	2.40
1¾ x 3½ x 42"	\$2.75

Wagon Evener Woods—

2 x 4 and 2 x 4½—Keller & Tamm's List—Discount	30%
Larger	25%

Buggy Evener Woods—All Grades

Keller & Tamm's List—Discount	25%
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Buggy Whiffletree Woods—

Mixed Second Growth and Second Growth—Keller & Tamm's List—Discount	20%
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Buggy Neck yoke Woods—All Grades

Keller & Tamm's List—Discount	20%
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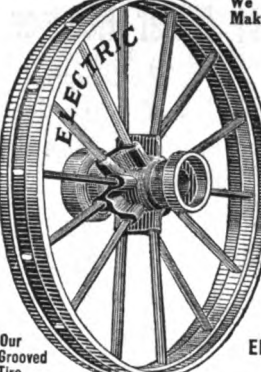


DON'T FORGET THIS FACT

You will receive better pay for your repair work when you use **STAR STEEL SHAPES**.
The "Triple Merit" Line—Soft Center, Solid Cast, Crucible Steel.

Look For The STAR When You Order
Plowshares, Listershares, Moldboards, Plow Points, Seeder Points, Cultivator Shovels, Land-side Plates, Landside Points, Shovel Points, Drill Points, Subsoilers.

STAR MFG. COMPANY, Carpentersville, Ill.



STEEL WHEELS

To Fit Any Axle
Plain or Grooved
Tire

Steel or Hickory Axles

Any Size
A Full Line of
Wood and Steel
Farm Trucks
With Steel or
Wood Wheels

Write for Large
Catalog and
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ELECTRIC WHEEL CO.
Box A, Quincy, Ill.



EMPIRE STEEL WHEELS

Plain or Grooved
Tire

To Fit Any Wagon
Farm Trucks
All Standard Types

Write today for
Proposition to Blacksmiths.

Empire Mfg. Co.
P. O. Box 366
QUINCY, ILLINOIS



Best Gasoline Brazing Forge

IN THE WORLD

Thousands sold in last ten years. Four sizes.

Send for Catalog.

The National Cement and Rubber Co.
308 S. St. Clair Street Toledo, Ohio, U. S. A.

Improve Your Wagon Work

by putting on this Threlkeld Malleable Iron Standard. Specially designed for wood balsters. Greatly reduces the wear on the side of the box. Note the channel side permits using gas pipe for false standard to give continuous support. Write for circular today.

DONELSON MFG. CO., Chariton, Iowa.

"GEARS AND WAGONS"

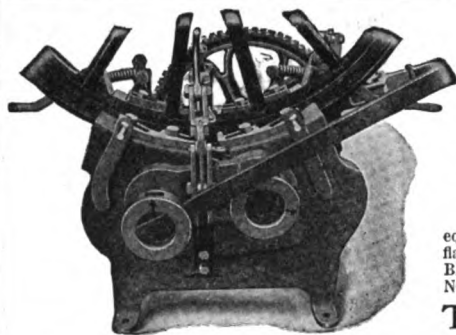
Selle Gears

A quarter of a century of success has placed "Selle Gears" and Wagons in the hands of the largest wagon users in the world.

Express and Transfer Companies, Department Stores, Fire Departments, etc., specify "Selle Gears" and will take no other after once tried.

230 page catalog free

THE AKRONSELLE CO. Akron, Ohio



The Brooks Cold Tire Setters

Set tires cold while on the wheel. Will do a week's work in a day's time, and do it better than can be done the old way. The greatest trade builders and money makers that can be placed in a shop. Every bearing is machine finished. The heads have a circular movement which prevents straightening or flattening or kinking the tire where it is upset. Used by thousands of blacksmiths. The only cold tire setter in use and endorsed by the United States Government. We manufacture both Hydraulic and lever cold tire setters.

We are also manufacturers of the latest improved Oxy-Acetylene Welding Machines and Acetylene Generators, equipped with our famous Flash Back Safety Valve. No possible danger of an explosion or bad results from a flash back. We also build Welding Outfits to be used with cylinder compressed gas. Nothing better than the BROOKS. Our products are all fully guaranteed. Drop us a card and we will send you our booklets. DO IT NOW before you forget it.

THE BROOKS MACHINE CO., Wichita, Kansas, U. S. A.

The Perfect Power Hammer



The Simplest
in Construction

The Most
Effective in
Operation
The Most
Durable and

THE BEST

MADE IN TWO
SIZES:

3 inch square, 40 lb.
r a m — shipping
weight, 1,100 lbs.

4 inch square, 80 lb.
r a m — shipping
weight, 1,800 lbs.

Write any jobber
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**MACGOWAN & FINIGAN
FOUNDRY & MACHINE CO.**

204 North Third Street
ST. LOUIS, MO.

"NEW
EASY"

4 Sizes

BOLT CLIPPERS

"EASY"

2 Sizes

THE
GENUINE
TOOL



KNOWN AND
PREFERRED
EVERYWHERE

H. K. PORTER

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U. S. A.

EVER-READY BLANK SHARE

THE
BLACKSMITH'S
FAVORITE

Can be fitted to
more styles of
plows than can
any other pattern.



To save labor
use our Fitted
Shares for all
makes of plows.

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CRESCENT FORGE & SHOVEL COMPANY

MANUFACTURERS OF HIGH GRADE
FLOWSHARES AND BLACKSMITHS' BLANKS

HAVANA, ILL., U. S. A.

"Bay State" Carriage and Tire Bolt Ratchet Wrenches

Labor
Savers!
Money
Savers!



Three Sizes
Take Hex and
Square Nuts

GEO. A. CUTTER, Sales Agent, Taunton, Mass.

Ask Your Dealer

Horse Shoe Bar Iron

MADE BY

**The Milton Mfg.
Company**

MILTON, PENN'A

Is of Superior Strength
and Quality. We can prove
it. Write us.

THE HORSE RASP OF QUALITY



Ask your dealer for the IMPROVED HELLER RASP with keen cutting hard teeth. Made in all patterns and cuts. "Slim," "Light," "Slim Light," and "Fine Cut." Insist on getting the size, kind and cut best suited for your work. It will pay you to give them a trial. New catalogue mailed free on application.

ESTABLISHED IN 1836

HELLER BROTHERS COMPANY

NEWARK, N. J.

JUST WHAT YOUR SHOP NEEDS

Save 75% of the Time and Over 50% of the Hard Work
connected with your hot cutting jobs by the use of a

Simonsen Hot Trimmer

It is an actual fact that with this shear you not only save time and hard work which will add much to your profits during the season, but many of the jobs you now hate will become a pleasure to you when you find how you can do them so easily and with such added profits.

Ask your jobber—or write us mentioning his name. Our circular B, showing several styles of shears, is free.

SIMONSEN IRON WORKS, SIOUX RAPIDS, IOWA, U. S. A.
Exporters: Henry W. Peabody & Co., New York, N. Y.



**CURRENT HEAVY HARDWARE PRICES.**

The following quotations are the lowest prices generally prevailing July 18th, 1916. They are subject to change without notice, and higher prices are charged according to quality, specification and other conditions. There are no changes reported in Current Heavy Hardware Prices as listed this month. There seems to be no weakening of the market not withstanding the rumors of a falling off in foreign orders. Mills are able to deliver more promptly but they are still behind with their orders.

Business is generally reported as good and crop prospects are much better. The "Corn Belt" is getting its much needed hot weather and the outlook is improving daily.

Collections are reported as quite active.

Horse Shoes—

All Iron Shoes	\$5.00
Steel Shoes	5.00
No. 0 and No. 1, 25 cents extra. 15 cents per keg additional charged for packing more than one size in a keg.	
Mule Shoes	
X. L. Steel Shoes	
Countersunk Steel Shoes	
Tip Shoes	
Goodenough, heavy	
Goodenough, sharp	
Toe Weight	
Side Weight	
E. E. Light Steel	
Steel Driving	
O. O. Mule Shoes, extra.	

Anvils12 3/4

Merchant Bar Iron—

\$3.30 rates, full extras, and 20 cents per 100 pounds extra for broken bundles.

Steel Bars—

\$3.30 rates, full extras.

Toe Calks—

Blunt	Per Box
Sharp	\$1.65

Screws Calks—

	5-16	7-16	1/2	3/4
Blizzard M.	\$18.00	\$18.00	\$30.00	\$22.00
Sure Grip M.	18.00	18.00	30.00	22.00
Bl. Diamond M.	18.00	18.00	30.00	22.00
Red Tip M.	20.00	20.00	22.00	24.00
Bow, Jr. M.	18.00	18.00	20.00	22.00
R. Rg. Ft. M.	20.00	20.00	22.00	24.00

Plow Lays—

Solid Cast	\$.08 3/4
Crucible	\$.09 3/4
Soft Center	.13

Fitted Plow Lays—

Crucible, 12"	\$1.20
Crucible, 18"	1.80
Softer Center, 12"	1.95
Soft Center, 18"	2.60

Hickory Lumber—Per Foot—

1 to 2 1/2	\$.10
1 1/2 to 4 1/2	.12

Ash and Oak Lumber—Per Foot—

1 to 1 1/2	\$.08	2 1/2 to 3	\$.09
1 1/2 to 2	.08 1/2	3 1/2 to 4	.10

Yellow Popular Lumber Per M. Feet—

	6 to 12	12 to 17	18 to 24
3/4"		\$75.00	\$85.00
1"		75.00	90.00
1 1/4"		78.00	95.00
1 1/2"		85.00	114.00
2"		85.00	114.00

Rough Hickory Axles—

3 x 4 ft.	\$.75
3 1/2 x 4 1/2 ft.	1.00
4 x 5 ft.	1.30
5 x 6 ft.	2.40
4 x 5 1/2 ft.	1.75
4 1/2 x 5 1/2 ft.	2.30
5 x 6 ft.	2.80
5 x 7 ft.	2.80
5 x 7 1/2 ft.	3.40

Finished Hickory Axles

For 2 1/2 and 3 1/2 Skeins	\$.95
For 3 Skeins	1.10
For 3 1/2 Skeins	1.35
For 3 3/4 Skeins	1.50
For 3 1/2 Skeins	1.80
For 4 Skeins	2.10

Rough Oak Bolsters—

	3 x 4	4 x 4 1/2	12 x 14	14 x 16
3 x 4	\$.36	\$.40	\$1.30	\$1.75
4 x 5	.60	.70	2.20	3.00
5 x 6	1.00	1.20		

Finished Oak Bolsters—

2 1/2 x 3 1/2 and under	80c
3 x 4	85c
3 1/2 x 4 1/2	80c

Rough Oak Wagon Tongues—

4 x 4, 2 x 4 12 and smaller	\$1.15
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Finished Oak Wagon Tongues—

3 1/2 and smaller	\$1.35
3 1/2	1.45
4	1.55

Two-Inch Sawed Hounds—

	Per Pair
Tongues	35c
Front	40c
Hind	50c

Wheels—

Sarven Patent—white—not tired	50%
Tiring—No. 13 and less	45%
Tiring—No. 17 and larger	30%
Screws 1 1/2" Thread and less	50%
Rivets 1 1/2" Thread and less	40%
Screws or rivets 1 1/2" and heavier	40%
Boring or Boxing less than 10 cents lots	40%
Boring or Boxing 10 sets or more of one size	80%
Priming Wheels, net	25c
Oiling, not tired, set	20c
Allowance of 25 cents per set on all special tired wheels with three or four piece rims	
Oiling, not tired, No. 17 to No. 39	25c
Oiling No. 45 and larger	40c

Special Wheel Tired—"E"

	Grade 8 piece Rim—
0 1/2 x 1 1/2	\$8.95
1 1/2 x 1 1/2	7.20
3 1 x 1 1/2	7.65
8 1 x 5-10"	7.90
9 1 1/2 x 1 1/2	\$ 9.35
9 1 1/2 x 5-10"	9.80
13 1 1/2 x 5-10"	12.00
13 1 1/2 x 1 1/2	12.40

Cupped Oak Hubs—

	Plain End Oak Hubs—
10 x 14	\$8.80
11 x 14	4.20
11 x 15	4.50
11 x 16	5.10
12 x 16	5.75
12 x 17	6.30
13 x 18	6.00
7 x 8 x 9	\$1.15
7 x 9 x 10	1.25
8 x 9 x 10	1.25
8 x 10 x 11	1.60
9 x 10 x 11	1.89
9 x 11 x 12	1.80
10 x 12 x 13	2.75
11 x 13 x 14	3.90
12 x 14 x 15	4.50

Rough Sawed Fellos—

1 1/2 x 2"	\$1.70
1 1/2 x 2 1/2"	1.90
1 1/2 x 3"	2.00
3 x 3 1/2	\$5.75
2 x 2 1/2"	\$2.10
2 1/2 x 2"	4.60
3 x 3"	5.80

Ironed Poles, White, XXX

1/2 x 2 1/2" No. 2	\$3.80
2 x 2 1/2" No. 3	3.80

Ironed Shaft, White, XXX—

1 1/2 x 2" and smaller	\$1.95
1 1/2 x 3"	2.20
1 1/2 x 3 1/2"	2.70

Farm Wagon Bows—

Round Top, 1/2 x 2"	\$.60
Flat Top, 1/2 x 2"	.75
Round Top, 3/4 x 2 1/2"	1.35

Standard Size Piano Bodies with Seats—

Each	\$4.25
------	--------

Plow Beams—

1 Horse	\$.60
2 Horse	.75
3 Horse	1.10

Spokes and Rims—

Oak and Hickory Spokes, net on Weiss & Lash List No. 6	
Finished Rims—XX—7/8"	\$1.75
Finished Rims—XX—1"	1.65
Oak Rims—Discounts	40-10%
Hickory Rims	40%

Wagon Neck yoke Woods—

Keller & Tamm's List—Discount	25%
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Wagon Whiffletree Woods—All Grades—

Keller & Tamm's List—Discount	25%
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Oral Plow Doubletrees—

2 1/2 x 36"	\$1.80
2 x 40"	2.40
1 1/2 x 3 1/2 x 42"	\$2.75

Wagon Evener Woods—

2 x 4 and 2 x 4 1/2—Keller & Tamm's List—Discount	30%
Larger	25%

Buggy Evener Woods—All Grades

Keller & Tamm's List—Discount	25%
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Buggy Whiffletree Woods—

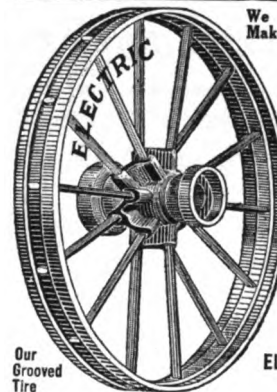
Mixed Second Growth and Second Growth—Keller & Tamm's List—Discount	20%
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Buggy Neck yoke Woods—All Grades

Keller & Tamm's List—Discount	20%
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HONEST DEALINGS

Before a display advertisement is accepted for this Journal, inquiry is made concerning the standing of the house signing it. Our readers are our friends and their interests will be protected. As a constant example of our good faith in The American Blacksmith advertisers, we will make good to subscribers loss sustained from any who prove to be deliberate swindlers. We must be notified within a month of the transaction giving rise to the complaint. This does not mean that we will concern ourselves with the settlement of petty misunderstandings between subscribers and advertisers, nor will we be responsible for losses of honorable bankrupts, nor can it include advertisements under the head of "Wanted and For Sale."

**We Make STEEL WHEELS**

To Fit Any Axle
Plain or Grooved
Tire

Steel or
Hickory Axles

Any Size
A Full Line of
Wood and Steel
Farm Trucks

With Steel or
Wood Wheels
Write for Large
Catalog and
Prices

ELECTRIC WHEEL CO.

Box A, Quincy, Ill.

EMPIRE STEEL WHEELS

Plain or Grooved
Tire

To Fit Any Wagon

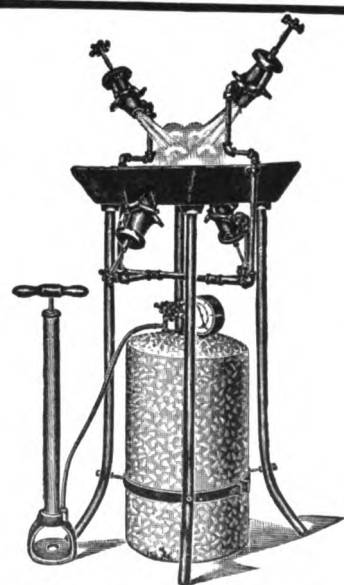
Farm Trucks

All Standard Types

Write today for
Proposition to Black-
smiths.

Empire Mfg. Co.

P. O. Box 306
QUINCY, ILLINOIS

**Best Gasoline Brazing Forge**

IN THE WORLD

Thousands sold in last ten years. Four
sizes. Send for catalog.

The National Rubber & Specialties Co.

4433-39 Chickering Ave., Winton Place,
Cincinnati, Ohio.

Improve Your Wagon Work

by putting on this Threlkeld Malleable Iron Standard. Specially designed for wood balsters. Greatly reduces the wear on the side of the box. Note the channel side permits using gas pipe for false standard to give continuous support. Write for circular today.

DONELSON MFG. CO., Chariton, Iowa.

"GEARS AND WAGONS"**Selle Gears**

A quarter of a century of success has placed "Selle Gears" and Wagons in the hands of the largest wagon users in the world. Express and Transfer Companies, Department Stores, Fire Departments, etc.; specify "Selle Gears" and will take no other after once tried.

230 page catalog free

THE AKRON-SELLE CO.

Akron, Ohio



For REAL MONEY

EVERY Day of the Year

the wise Smith installs this Famous Woodworker. With this complete machine every kind of wood-working job is open to you—and there is good money in every one.

USE OUR EASY PAYMENT PLAN

Not only can you obtain a Famous Woodworker for as low as \$125 but you can also arrange a series of easy payments. Don't go without a Famous simply because you don't happen to have the ready cash.

Free Circular—telling all about the several Famous models and their attachments—will be sent gratis if you will write today.

SIDNEY TOOL COMPANY

DEPT. 14,

SIDNEY, OHIO, U. S. A.

A 13-INCH complete Hand Planer or Jointer ready for the belt, showing the front end of machine with the guide set part way across table for 45-degree bevel, and quick easy adjustment to change the cut.

This machine will plane a 12 or 12½ inch wide lumber nicely, the cutter head being 13-inch leaves margin enough so that if you have lumber over 12 inches or that is not straight and has to be jointer on the edge after. This leaves the work 12 inches wide when finished. The advantage in having a 13-inch machine is apparent, if you have ever tried to work out 12-inch lumber on a 12-inch machine.

Your wood work is an easy job on one of these machines, and your customers are pleased as well as yourself.

For further information, send for Catalogue No. 12.

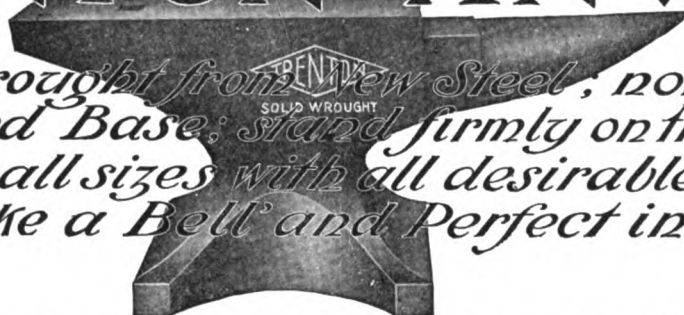
W. L. SHERWOOD,

Kirkville, Mo.



TRENTON ANVILS

*Solid Wrought from New Steel; not cast.
Recessed Base: stand firmly on the block
Made in all sizes with all desirable Clips.
'Ring like a Bell' and Perfect in Shape.*



THE COLUMBUS FORGE & IRON CO. COLUMBUS, O.

Mr. Horseshoer:

We make such a variety of shoes to meet every need that it would take several pages to illustrate our line.

Consequently we beg that you favor us with a postal card to instruct us to send you

OUR NEW BOOKLET NO. 18

Bryden Horse Shoe Company

Catasauqua, Pa.



BETTER THAN THREE SLEDGE HAMMERS

Little Iowa Power Hammer No. 3

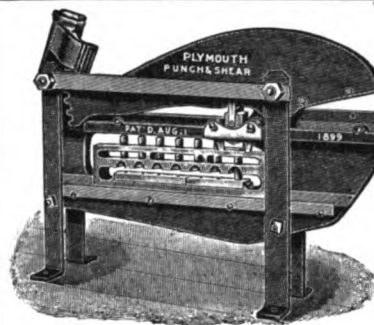
No three men can hammer out as much work as this easily operated, powerful hammer. And it has an even stroke, and accuracy impossible to attain by human efforts.

Powerful 35-pound hammer head with a total weight of 850 pounds and a compact base, 22 inches by 38 inches. Guaranteed to satisfy. If it fails, send it back at our expense. We'll refund your money. Price, \$75.00. Send for descriptive booklet.

Every United States jobber represents us. Canadian Agent: D. Ackland & Son, Ltd., Winnipeg, Can. Agent for Montevideo-Uruguay, Casa en Pando: Ambrosia Bertolotti.

MODERN SALES CO.

Hampton, Iowa - - U. S. A.



Every Blacksmith and Repair Shop

should save time, money
and hard work by having
a

PLYMOUTH PUNCH AND SHEAR

The only machine that will punch seven different size holes without removing the punches from the machine. Automatic sliding punch rack, no wrench required. Don't accept any other just as good.

Ask your supply house for circular and price or write to the

PLYMOUTH FOUNDRY & MACHINE CO.
PLYMOUTH, WIS.

NEED HELP?

Our Subscriber's Service Department is ready to help you with the jobs that puzzle—buying of supplies—with your printing, shop plans and bookkeeping—with the thousand and one other things that are always coming up to bother you. When in doubt ask the Service Dept. It's their business to help you.

THE AMERICAN BLACKSMITH,

Box 974, :: BUFFALO, N. Y., U. S. A.

Save an Hour a Day

During the busy grinding season and turn out cleaner, keener work by using

CHICAGO QUICK CUTTING GRINDING WHEELS

Do more grinding every day and increase your profits by using Chicago Wheels.

Chicago Wheels are made in all grades for every purpose. Write us about your work and we will tell you just how to get best wheel for your purpose. Ask for interesting catalogue and complete information.

Don't forget to insist upon your dealer furnishing you with the grinding wheels you can have faith in—CHICAGO WHEELS.

CHICAGO WHEEL & MFG. CO.

108 So. Aberdeen Street,

CHICAGO, ILL., U. S. A.



TRADE LITERATURE AND NOTES.

The Value of Science in the Smithy and Forge, by W. H. Cathcart—5 x 7 inches—160 pages—75 illustrations—Cloth—Price, \$1.50 or 6/6—J. B. Lippincott Co.

What practical smith has not asked himself or others many questions regarding the science of the smith shop, forge and anvil operations? How many times has the smith questioned and puzzled over the problem of what is a weld and why does iron weld? And while, in all likelihood the scientist cannot actually weld, temper or forge, the scientist can answer the question. This book is written by a thoroughly practical smith, who, with an appreciative regard for the science of forging tells in an excellent manner the part that science plays in the work of the smith.

Beginning with a chapter on Calculations of Forgings in which Mr. Cathcart goes into the material needed, the losses in heating and the advantages of correct calculations, and then follows chapters on Strength of Materials,—Mechanical Drawings—Heating—Metallography in which the fibre and structure of iron and steel is discussed and pictured—Heat Treatment in which overheating, annealing and similar subjects are explained and made clear from a scientific point. And finally are the chapters on the Chemistry of Welding and on Case Hardening.

For the smith who wants to know something more than merely how to weld and to work iron and steel—who wants to know what happens inside the metal when he is working it, this book, "The Value of Science in the Smithy and Forge," will prove of interest and value. Mr. Cathcart, himself a practical smith, and President

of the Associated Foremen Smiths of Scotland, has written a book that should be in every smith's library—a book that will clear up many a mystery for the practical forger of iron and steel.

"Shoeing and Balancing the Light Harness Horse," by James Clark. 100 pages, illustrated, cloth. Price, \$1.00 or 4/6.

In this little book Mr. James Clark has given to the shoers of speed horses just the information they want, beginning with a first chapter on the treating of the colt's feet before shoeing, he goes into the details of the first set of shoes and then covers the subject of sore feet, knee-hitting and the various other troubles and disturbances which the average shoer is called upon to correct.

The author also goes into the details of bar shoes, calks and grabs, aluminum shoes, extension shoes, etc. The last 20 pages of this book are devoted to illustrations of shoes of various styles to bring about the different results in the gait of the animal.

Any shoer who is interested in shoeing of the light harness horse, will find this book by Mr. Clark of practical value and help.

"Why?" is the name of a free book just written by Edward H. Witte, of the Witte Engine Works, makers of Witte engines. This book is an exceedingly interesting little work on engines that every power using smith would want to read and keep for handy reference. It is also a book that would be of considerable value to the smith who does not as yet use power but who realizes that sooner or later his shop will need a modern engine.

To obtain a free copy of this book just write "Why" on a postcard or scrap of

paper, with your name and address and mention **THE AMERICAN BLACKSMITH**. Address your request direct to Mr. Witte, 176 S. Oakland Avenue, Kansas City, Mo.

Every smith who uses grinding wheels or abrasives will be interested in the new 1916 catalog published by the Norton Company. This book gives complete explanation of the various Norton productions which embrace grinding wheels, polishing wheels, oil stones, sharpening stones, glass cutting wheels, scythe stones, refractories, grinding compounds, rubbing bricks and stones, grinding machinery and grinding wheel dressers.

This catalog is more than ordinarily interesting because of the instructive information it contains regarding the modern production of abrasive material. Photographs are shown of the electric furnace for operation in connection with the production of crystolon. This is a product which has no counterpart in nature, having been produced only since the electric furnace became practical.

This catalog is one of the highly instructive works of modern business literature which the progressive shop owner finds so helpful. For a free copy address The Norton Company, Worcester, Mass., U. S. A., mentioning **THE AMERICAN BLACKSMITH** in your letter.

Questions and Answers on Automobile Design, Construction and Repair, by Victor W. Page, 650 pages—350 illustrations and plates. Cloth, \$1.50 or 6/6. Norman Henley Publishing Company.

Troubles and repairs for all parts of the automobile are made plain and the automobile repairman will find this entire book just heapingful of sound, practical information on the motor vehicle.

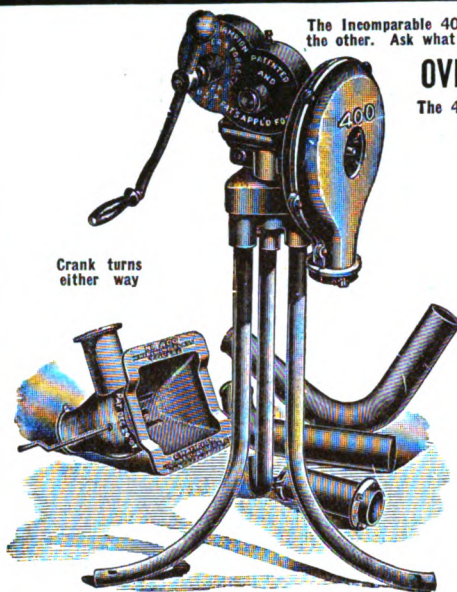


The incomparable 400 Blower, the one great heirloom that will be handed down from one generation to the other. Ask what the owners say. **MADE WITH BALL BEARINGS ONLY.**

OVER 750,000 CHAMPION 400 BLOWERS IN USE.

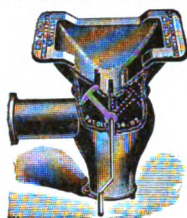
The 400 is the Blower that has Revolutionized the World in making Hand Blast.

Tuyere Iron That Makes a Whirlwind Blast



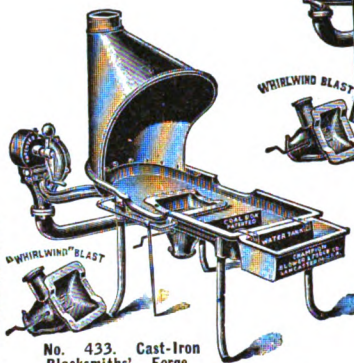
Crank turns either way

No. 400.

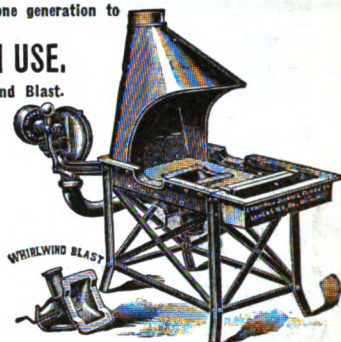


The "Whirlwind" Blast Anti-Clinker, Heavy Nest Tuyere Iron produces a circular, rotary whirlwind blast and concentrates the heat in the tuyere nest, not permitting it to blow up and out of the chimney, therefore makes a hotter fire and heats the iron one-third quicker; saving much coal.

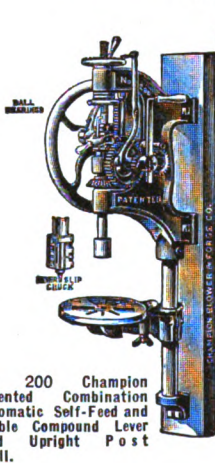
The No. 400 "Whirlwind" Blast, Anti-Clinker, Heavy Nest Tuyere Iron is furnished with all 400 Blowers **WITHOUT EXTRA COST.**



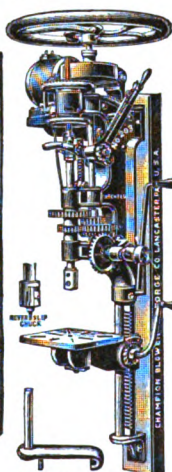
No. 433. Cast-Iron Blacksmiths' Forge



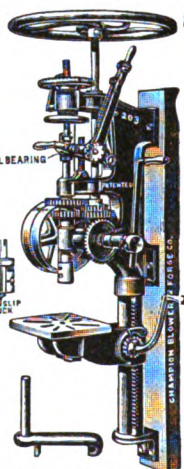
No. 408. Steel Blacksmiths' Forge.



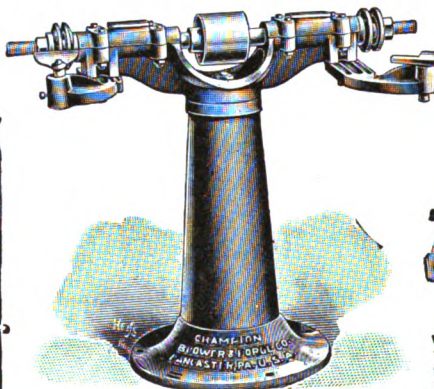
No. 200 Champion Patented Combination Automatic Self-Feed and Double Compound Lever Feed Upright Post Drill.



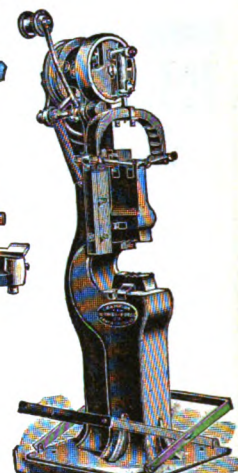
No. 203. Self-Feed and Double Compound Lever Feed, Electrically Driven Post Drill.



No. 203. Self-Feed and Double Compound Lever Feed Drill.



No. 1. Champion Upright Column Grinder. Capacity, two 18 by 3 inch wheels.



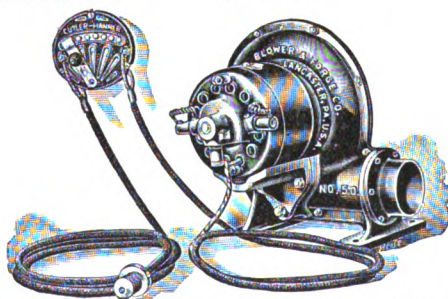
HERCULES PATENTED POWER HAMMER

Weight of ram, 65 pounds. The Power Hammer with the flexibility in stroke of a Hammer in a Mechanic's hand.

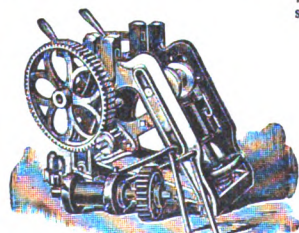


No. 4. AMERICAN TIRE AND AXLE SHRINKER.

Will shrink up to 4x1-inch round edge tire, and axle up to 1 1/4 in.



No. 50. Champion-Fire Variable Speed Electric Blacksmith Blower with a Universal Motor for Both Direct and Alternating Current, either 110 or 220 volts, with Detached Rheostat for six speeds, and Steel Pressure Blower Case, for all kinds of general Blacksmith work.

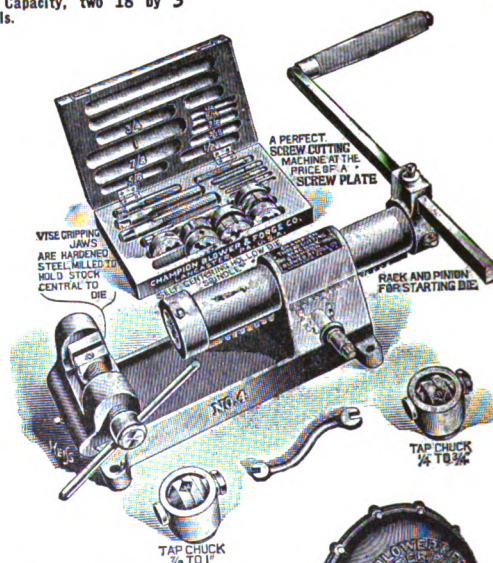


THE CHAMPION "COLUMBIAN" TIRE BENDER. Made in three sizes.

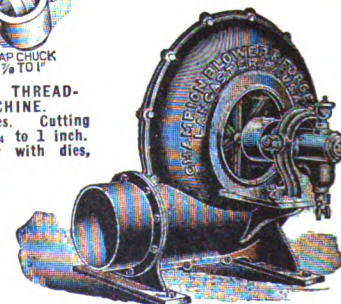


SCREW PLATES IN FOUR STYLES, CUTTING UP TO 1 1/2 IN.

Before purchasing a Hand Blower, Forge, Drill Press, Tire Bender, Tire Shrinker, Screw Plate, Power and Electric Blower, Hammer, Punch, or Shears, write for our free catalogue, which always shows the greatest variety of Improved Blacksmith tools built under one control in the world.



THE CHAMPION THREAD-CUTTING MACHINE. Made in four styles. Cutting from 1/4 to 3/4, or 1/4 to 1 inch. With dies only, or with dies, taps and tap chuck.



FAN BLOWERS MADE IN SIZES TO 64 INCHES IN HEIGHT

THE CHAMPION BLOWER AND FORGE CO., Lancaster, Pa., U. S. A.



TEST Your Coal--Constantly

KNOW every bit of coal that comes in your shop—find out just how much of a real Smithing coal it is—and you will avoid half of the troubles you now have.



Here's The Book You Want

It's one of the most practical little helps ever published for the craft.

It is from the pen of one who has devoted his lifework to the study and advancement of better Smithing. It gets right down to real Smithing conditions—and the simple helps it tells about, every Smith will be glad to know of.

Isn't it better to send for this valuable little work and spend a few minutes reading it **thoughtfully** than to gradually learn the truths it contains by long years of bitter experience?

If you pride yourself on being a progressive, up-to-date Smith don't be without this important booklet any longer. Let the coupon bring it to you.

FOR no sane Smith will keep on using a poor coal, even if it is a few cents cheaper, once he finds out that it not only hinders a good fire but actually spoils the stock.

DO YOU know how to test your coal—how to make sure that it will prove up to good Smithing requirements? There are five simple tests, that take no more than a second or two, which will give you instant information about your coal. Don't you want to know them? They're all in "Forge Fire Facts"—if you haven't a copy the coupon will bring you one, **Free**.

Webster Selected Smithing Coal

alone has received the following unqualified

Expert Endorsement

from Smiths you know as leading members of the craft whose judgement you can rely upon. Read what they say:

JAMES CRAN

"The writer—for some time has used nothing but the brand known as Webster Selected Smithing Coal. It has given equal satisfaction when used for the heaviest forging and welding as it has when used for the lightest and most delicate kinds of fancy forging".

J. F. SALLOWS

"It has many good qualities, is clean and free from sulphur, does not clinker up, and the few small clinkers are white, showing the coal is clean—have used nothing better along the line of Smithing Coal.

DAYTON O. SHAW

"I am using Webster Selected Smithing Coal and am more than pleased with the way it works. I find it superior to anything I have used for steel work". . .

Pennsylvania Coal & Coke Corporation
Whitehall Building, New York

BRANCH OFFICES:

BOSTON, 141 Milk Street
SYRACUSE, Union Building

HARTFORD, 36 Pearl Street
PHILADELPHIA, Land Title Bldg.

PENNSYLVANIA COAL & COKE CORPORATION
Whitehall Building, New York, N. Y.
Gentlemen—Send me a free copy of your new
Booklet "Forge Fire Facts."
Name _____ Address _____ State _____
Oct., A. B.



Why Not Stop Those Welding Troubles?

Don't put up with welding failures and delays any longer—let Banner Welding Compound bring you COMPLETE success.

With Banner, welding won't take you near as long or cost half as much. Use Banner and you can weld at lower temperatures and have perfectly even, smooth welds without the compound falling off while heating, or leaving hard scales.

FREE TRIAL Satisfy yourself about Banner Welding Compound in your own shop at our expense. Just write us, enclosing name of your jobber, and we will send a liberal free sample—DON'T MISS IT.

The Cortland Specialty Co.
CORTLAND, N. Y.

JONES URGES "DO IT RIGHT"

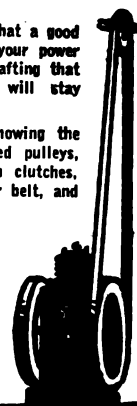
"When putting power equipment in your shop remember that a good engine isn't all that is necessary if you are going to run your power machines economically. It is just as important to put in shafting that won't work loose and pulleys that will stay straight".

Send for free catalog No. A-18 showing the Jones complete line of machine moulded pulleys, shafting, hangers, boxes, gears, friction clutches, sprocket wheels, chain, leather or rubber belt, and other transmission equipment.

W. A. Jones Foundry & Machine Company

1449 West North Ave., Chicago, Ill.

NO ORDER TOO SMALL as the same careful, prompt attention is given to small orders as to large ones.



TRADE MARK
O. S. & CO. MARK



TRADE MARK
O. S. & CO. MARK

The reason why standard articles are sold under a trademark or brand is to protect the purchaser from substitution. If you insist on having Pioneer Shaft Ends, you will get the best the market affords. Don't accept substitutes. Look for our trademark on the paper wrapper containing each Shaft End. Pioneer Shaft Ends, with the dowel splice, give you the strongest, quickest and easiest joint that can be made. They have double tubes, and are superior in finish. Your jobber will supply you; if not, write us.

CRANDAL, STONE & CO.,

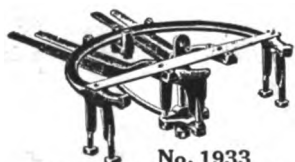
Makers of Pioneer Shaft Ends

BINGHAMTON, N. Y.

TRADE MARK
O. S. & CO. MARK

TRADE MARK
O. S. & CO. MARK

Wilcox FINE FINISHED FORGED



No. 1933
FOR DOUBLE REACH, SPREAD OR TWIN.

Carriage Hardware and Gear Iron

Write us for Catalogue No. 11C

The D. Wilcox Mfg. Co.

Mechanicsburg

Cumb. Co., Pa.

"First Made in America."

Hay-Budden Solid Forged Anvils

HAY-BUDDEN MFG. CO., Brooklyn, N. Y.



200,000 in Use.

Entire top being in one piece of high-grade forged steel, makes a loose face impossible.



Best in the world at a fair price, not cheapest regardless of quality.

Profitable Thoughts

If I order Capewell Nails there'll be no waste — no time lost — no "kicking."

Capewell nails are made so they'll drive easiest and hold best. No danger of splitting or crimping, and a box of them will go farther than inferior brands.

It will pay to order the nail with the checked head Trade Mark.

THE CAPEWELL HORSE NAIL CO.

HARTFORD, CONN., U. S. A.

Leading Horse Nail Makers of the World

NOV 19 1915

VOLUME 15

THE

NUMBER 2

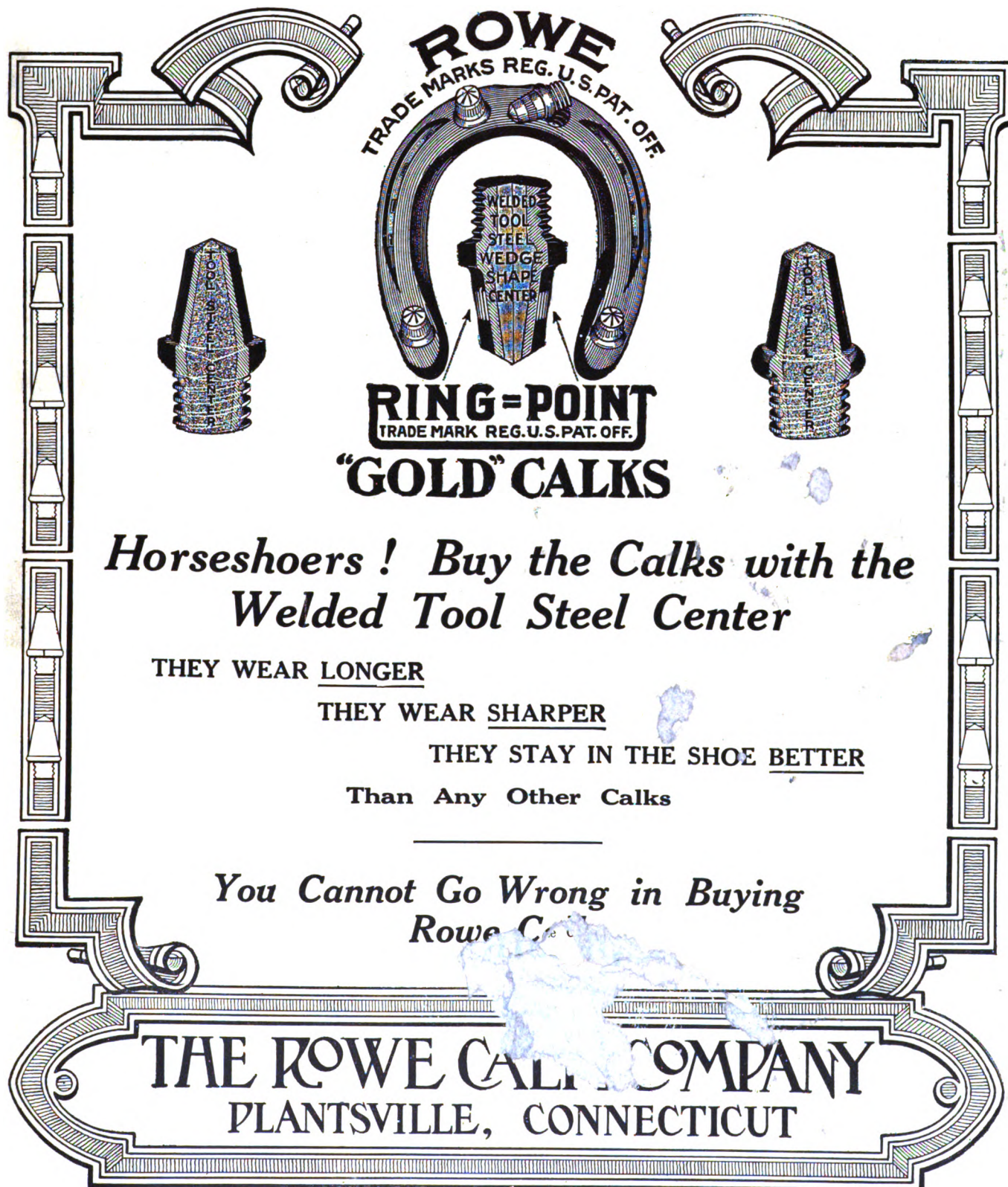
AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N. Y., U. S. A.

NOVEMBER, 1915

\$1.00 A YEAR
10c. A COPY



The advertisement is framed by a decorative border. At the top center is a horseshoe with the brand name 'ROWE' in an arch above it. Below the horseshoe, the text 'TRADE MARKS REG. U.S. PAT. OFF.' is written in a semi-circle. In the center of the horseshoe is a 'WELDED TOOL STEEL WEDGE SHAPE CENTER'. Below the horseshoe, the text 'RING-POINT' is written in a bold, sans-serif font, with 'TRADE MARK REG. U.S. PAT. OFF.' underneath it. Below this, the text '“GOLD” CALKS' is written in a large, bold, sans-serif font. To the left and right of the horseshoe are two calks, each with the text 'WELDED TOOL STEEL' written vertically on its side. Below the '“GOLD” CALKS' text, the following text is written in a serif font: 'Horseshoers ! Buy the Calks with the Welded Tool Steel Center'. Below this, the text 'THEY WEAR LONGER' is written, followed by 'THEY WEAR SHARPER', and then 'THEY STAY IN THE SHOE BETTER'. Below this, the text 'Than Any Other Calks' is written. Below this, the text 'You Cannot Go Wrong in Buying Rowe Calks' is written. At the bottom, the text 'THE ROWE CALK COMPANY' is written in a large, bold, sans-serif font, with 'PLANTSVILLE, CONNECTICUT' written below it in a smaller, bold, sans-serif font.

ROWE
TRADE MARKS REG. U.S. PAT. OFF.

WELDED
TOOL
STEEL
WEDGE
SHAPE
CENTER

RING-POINT
TRADE MARK REG. U.S. PAT. OFF.

“GOLD” CALKS

*Horseshoers ! Buy the Calks with the
Welded Tool Steel Center*

THEY WEAR LONGER
THEY WEAR SHARPER
THEY STAY IN THE SHOE BETTER
Than Any Other Calks

*You Cannot Go Wrong in Buying
Rowe Calks*

THE ROWE CALK COMPANY
PLANTSVILLE, CONNECTICUT



WHICH DO YOU WANT?

Trouble and customers
claiming you gave them
"cheap stuff"

OR

Success and satisfied
customers from using
only Genuine Giant Grips



The "Just as Good" Kind

Two calks broken off
(one at base of blade
thus necessitating tear-
ing off shoe,) one calk
lost out and one so soft
that it has been bent and
battered over; the shoe
broken at the second
nail hole.



GENUINE GIANT GRIPS

Genuine Giant Grip
calks will not fall out
or break off. They are
also uniform as to tem-
per. Genuine Giant
Grip shoes will NOT
break.

**"A Shoer's Reputation is Based on the
Quality of Goods he Uses"**

Yours for Quality

Write for Our
"Schedule of List Prices"

Giant Grip Horse Shoe Co.
Oshkosh, Wisconsin

AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y., U.S.A.

DECEMBER, 1915

\$1.00 A YEAR
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LONGEST
WEARING
NEVER
FALL OFF

SHARPEST
WEARING
NEVER
BREAK OFF

“GOLD” CALKS

A SATISFIED CUSTOMER is the best advertisement. ROWE CALKS will not only make your customers come back for more, they will also make him recommend them to his friends, tell them they can get them at your store.

The GOLDEN PLATE and the WELDED CENTER of close grained TOOL STEEL will gain you many new friends and will help to keep the old ones.

Get your stock of Rowe Calks now. The Winter is at the door and you will need not only calks, but calked shoes, drilled shoes, taps and drills and everything else in the



ROWE LINE



Write Us for Our Complete Catalog and Premium List.

THE ROWE CALK COMPANY
PLANTSVILLE, CONNECTICUT

2 THE AMERICAN BLACKSMITH DECEMBER, 1915

WHICH DO YOU WANT?

Trouble and customers claiming you gave them "cheap stuff"

OR

Success and satisfied customers from using only Genuine Giant Grips



The "Just as Good" Kind

Two calks broken off (one at base of blade thus necessitating tearing off shoe,) one calk lost out and one so soft that it has been bent and battered over; the shoe broken at the second nail hole.



GENUINE GIANT GRIPS

Genuine Giant Grip calks will not fall out or break off. They are also uniform as to temper. Genuine Giant Grip shoes will NOT break.

"A Shoer's Reputation is Based on the Quality of Goods he Uses"

Yours for Quality

Write for Our
"Schedule of List Prices"

Giant Grip Horse Shoe Co.
Oshkosh, Wisconsin

JAN 28 1916

VOLUME 15

NUMBER 4

THE AMERICAN BLACKSMITH

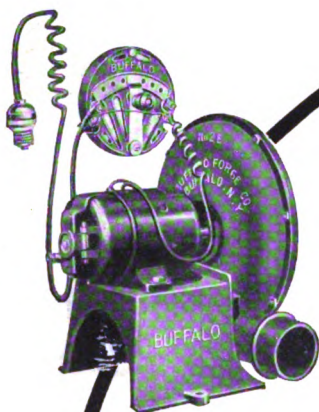
A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y., U.S.A.

JANUARY, 1916

\$1.00 A YEAR
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-HIGHER EFFICIENCY TOOLS-



Electric current can now be
had in most any locality at a cost
which is so low that the use of

Buffalo Electric Blacksmith Tools

is becoming more universal every day.

The Blacksmith, like other up-to-date mechanics is
looking to increasing his efficiency and at the same time
reducing his hard day's work.

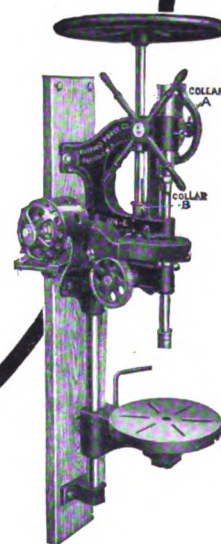
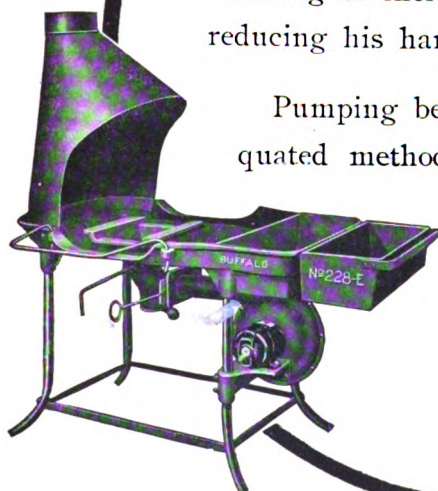
Pumping bellows and turning cranks are now anti-
quated methods and you as a modern blacksmith will
be interested in Buffalo Electric
Forges, Blowers and Drills.

Write for Catalog
179-1.

*New Years
Greetings*

*May the light
that illumines
the road to
prosperity burn
steadily for you.*

Buffalo Forge Co.



BUFFALO FORGE COMPANY

BUFFALO, NEW YORK.

Leading Manufacturers of Blacksmith Tools since 1878.

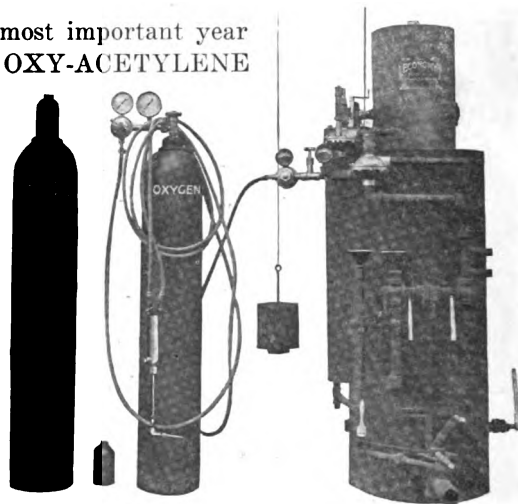


REAL WELDED TORCH

BIG PROFITS OR LITTLE PROFITS? Which Will You Make in 1916?

If you want to make 1916 the most important year of your business life GO INTO OXY-ACETYLENE WELDING.

But don't go into it just for a few extra dollars now and then—start right and make every cent of possible profit. That's the only way to begin if you would reap the full possibilities of this new work. Don't sacrifice a big share of your profits to the gas producers by making the mistake of starting with an incomplete plant.



Choose an Economy Apparatus and Make Your Own Acetylene

You'll save a dollar on every hundred feet of acetylene gas by using this complete Economy 30-A plant. And on a busy day that means a good many extra dollars.

Cut Gas Cost in Half

You can prove this quite easily. One hundred pounds of carbide will produce 450 to 475 cubic feet of gas—provided you are using the Economy Welding Outfit. That amount of gas would cost you from \$9.00 to \$9.50, exclusive of freight, if bought in drums. But you can buy the necessary carbide for about \$4.00 and save all the other expense when you use this plant.

No Bother or Worry

Besides what you save you have the added advantage of having a plant always ready for work.

You are relieved from all the bother and worry of ordering and changing tanks. You don't have to make any iron-clad agreement to be sure of an ample acetylene supply. There are no tanks to send for and to bother about returning. Yet the cost of this outfit is only a little more than what you have to pay for a make-shift equipment.

Make 1916 a Winner

This is the moment of decision—whether you will go on in the same old way in 1916 that made your business grow so slowly last year or whether you will let Oxy-Acetylene Welding give your shop a great, big boost. FIND OUT how easily you can do it if you simply make a right start by getting the Economy outfit—the *real* plant. Put your name on a post card and mail it on your way home TODAY.

ECONOMY WELDING MACHINE COMPANY

213 Southwest Boulevard, Kansas City, Mo.

WE CARRY THE LARGEST STOCK OF WELDERS' SUPPLIES IN THE WORLD

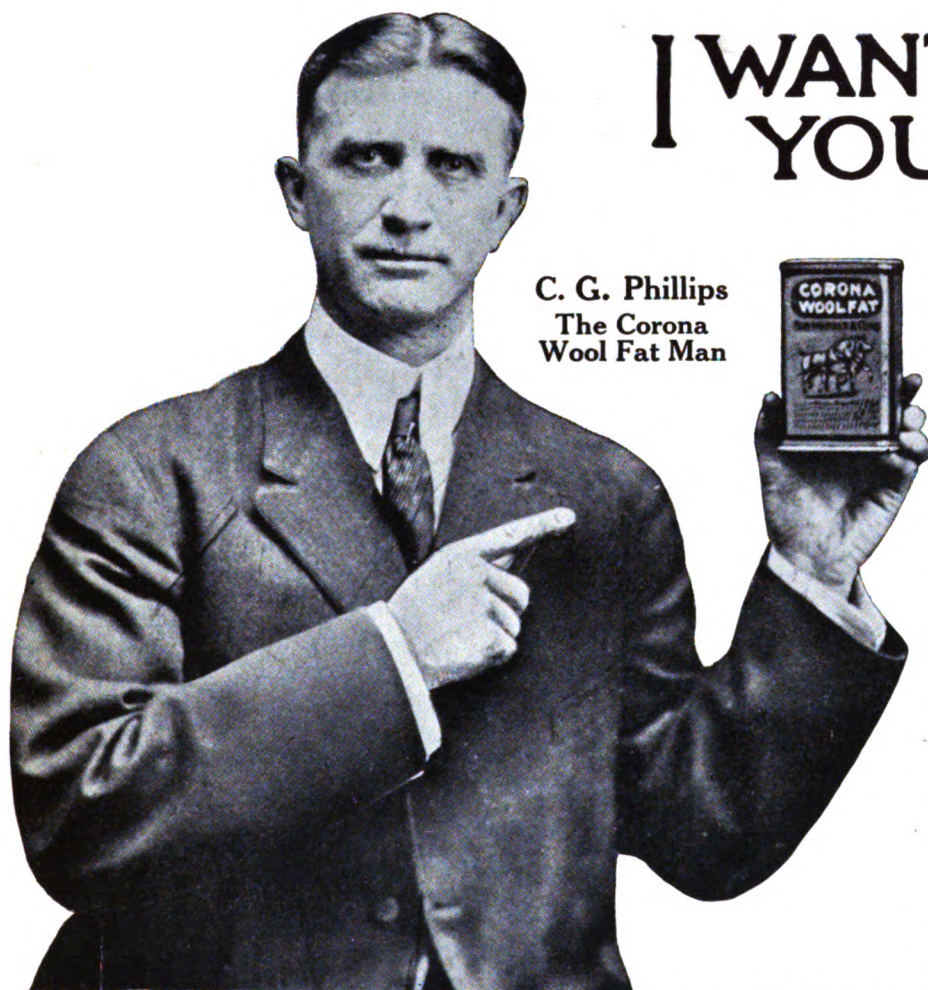
THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y., U.S.A.

FEBRUARY, 1916

\$1.00 A YEAR
10c. A COPY



C. G. Phillips
The Corona
Wool Fat Man

I WANT TO SEND YOU THIS

50¢ CAN
OF
CORONA
FREE

I KNOW CORONA—I KNOW WHAT IT
WILL DO FOR CATTLE AND HORSES
AND I KNOW WHAT IT WILL DO FOR
YOU AND YOUR BUSINESS.

THIS 50 CENT CAN IS WAITING FOR
YOU—I WANT YOU TO HAVE IT.

GIVE ME YOUR ADDRESS ON THE COUPON
TODAY AND WHEN I SEND THE CAN I WILL
TELL YOU HOW CORONA WILL MAKE MONEY
FOR YOU.

I want blacksmiths and horseshoers all over the country to act as my agents. CORONA is a money maker for the horseshoer. I know what I'm talking about. If I didn't, would I back up CORONA with such a strong guarantee? Would I offer you a 50c can for free trial if I didn't know that CORONA is positively the best article of its kind on the market today? I stand back of every can, just as I stand here holding out this free can for you.

Be the first in your town to look into this money making proposition. Try out the 50c can I offer to send you and then judge accordingly. Will you give me a chance to prove CORONA to you?

CORONA MFG. CO.

Lock Box "A"

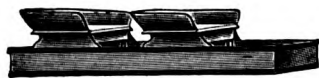
KENTON, OHIO

CORONA WOOL FAT will heal the worst cases of Cracked Hoof, Grease Heel, Corns, Mud Fever, Scratches, Gall Shoulder, Barbed Wire Cuts, Sore Teats of Cows, and all other hoof and skin diseases known to the animal kingdom.

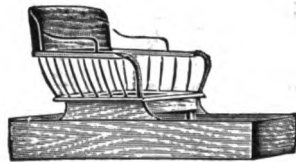
Tear on this line and mail, to Corona Mfg. Co., Kenton, Ohio.

Mr. Phillips:
I have never acted as your agent and will be pleased to give CORONA
a good test. Send me a 50c can free of cost and tell me how I can
make money selling CORONA.

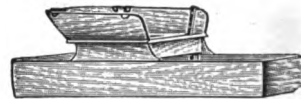
Name.....
Address.....
The name of my Iron Store Jobber is.....



No. 244. BODY AND SEATS
Price, no seats....\$5.75 and up
Price with seats... 7.75 and up



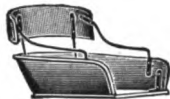
STICK SEAT BODY
\$5.90 and up



PIANO BODY
With seat.....\$3.85 and up
Without seat.... 2.95 and up



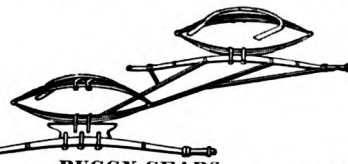
AUTO SEAT
Untrimmed \$2.65 and up
Trimmed . 7.48 and up



ROUND CORNER SEAT
Untrimmed \$2.90 and up
Trimmed ... 6.05 and up



PANEL SEAT
Untrimmed \$0.75 and up
Trimmed ... 3.85 and up



BUGGY GEARS
Each\$5.90
With Wheels and Shafts \$14.40 and up



AUTO SEATS—Top Seats
Seat\$2.65 and up
Top 7.75 and up
Cushion and back 4.55 and up
\$14.95



DOUBLE TREES WITH SINGLE TREES
Buggy and Surrey size... Each 75c



BENT REACHES
Assorted sizes.....6 for 60c



STRAIGHT REACHES
Assorted sizes.....10 for 60c



AXLE BEDS
Assorted sizes—drop....14 for 60c
Assorted sizes—arch.... 8 for 60c



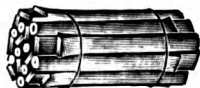
SPRING BARS
Assorted sizes.....14 for 60c



BUGGY AND SURREY SINGLE TREES
Assorted.....6 for 60c



BUGGY SPOKES
Per 100
1 1-16 in., Sar. Pat..\$2.95
1 in., Sar. Pat..... 1.90
1 1-16 in., C. B..... 2.25
1 7-16 in., Sar. Pat.. 3.50
15-16 in., Warner Pat 1.25



WOOD HUB SPOKES
per set
2 in.....\$2.00
2 1-4 in..... 2.30
2 3-8 in..... 1.80
2 1-2 in..... 2.75



ELLIPTIC CARRIAGE SPRINGS, 75c and up
AUTO SPRINGS
\$2.30 and up
Auto Tops \$19.95
Auto Roofs 7.95
Auto Seat covers \$3.57 and up.



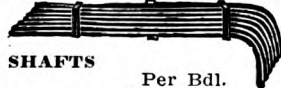
SHAFTS
Buggy size, painted 2.55
Buggy size, white..\$1.80



BAILEY BODY LOOPS
30 cents and up



POLES
Buggy or Surrey size..Per bundle, \$6.95

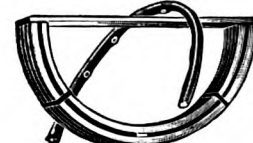


SHAFTS
Per Bdl.
Buggy size.....XX, \$5.95
Surrey size.....XX, 6.75

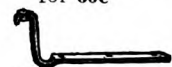


LIGHT WHEELS
With Steel Tire on \$5.90 and up
With Rubber Tire on \$12.55 and up
We make all sizes.
Auto wheels with demountable rims, \$13.95.

HEAD BLOCKS
Assorted sizes, 8 for 60c



RIMS
We carry all sizes
Plain Rims...\$1.15 and up
Beveled Rims 1.40 and up
Bored and Rounded Rims \$1.60
5 pieces bored and rounded rims, assorted sizes, for 60c



BODY LOOPS
2 Sets (8 pieces) for 65c



DASHES
20 in. drill...\$0.20
18 in. leather. 0.45
22 in. leather. 1.18
25 in. leather. 0.95



WHEEL HEAD RIVETS
Assorted sizes
12 lbs. for65c

Our Profit Sharing Plan

Special Inducements

On order of \$25.00 or over we allow a 3% cash discount and 1/2 freight charges if you live in Me., N. H., Vt., Mass., R. I., Ct., N. Y., N. J., Del., Va., W. Va., Pa., O., Md., Ind., Ky., Tenn., Ills. or Mich.

All other States 1/4 freight charges and 3% cash discount.

On orders of \$40.00 or over, we allow a 4% cash discount and full freight charges if you live in Me., N. H., Vt., Mass., R. I., Ct., N. Y., N. J., Del., Va., W. Va., Md., Pa., O., Ind., Ky., Tenn., Ills. or Mich.

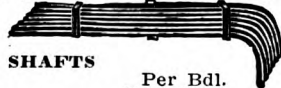
All other States 1/4 freight charges and 4% cash discount.

On orders of \$75.00 or over, we allow a 5% cash discount and full freight charges if you live in Me., N. H., Vt., Mass., R. I., Ct., N. Y., N. J., Del., Va., W. Va., Md., Pa., Ohio, Ind., Ky., Tenn., Ills. or Mich.

All other States 1/4 freight charges and 5% cash discount.



POLES
Buggy or Surrey size..Per bundle, \$6.95



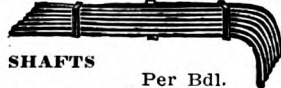
SHAFTS
Per Bdl.
Buggy size.....XX, \$5.95
Surrey size.....XX, 6.75



BAILEY BODY LOOPS
30 cents and up



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Buggy or Surrey size..Per bundle, \$6.95



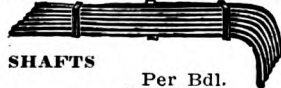
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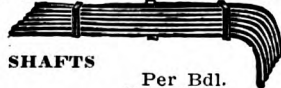
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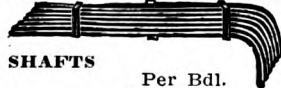
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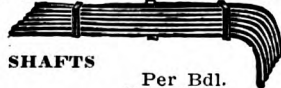
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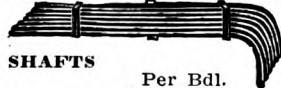
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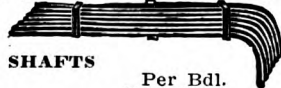
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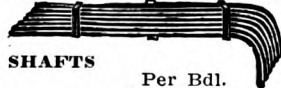
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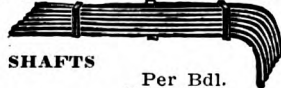
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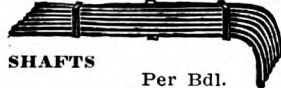
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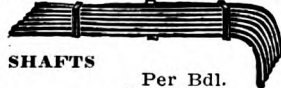
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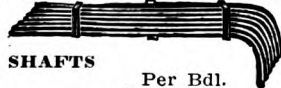
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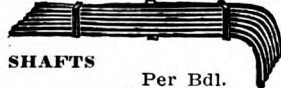
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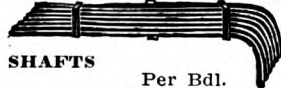
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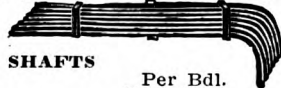
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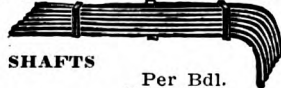
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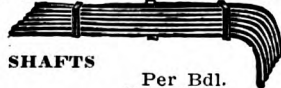
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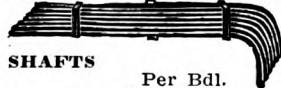
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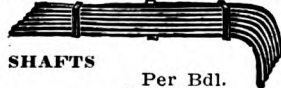
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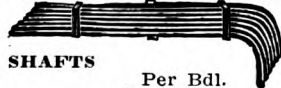
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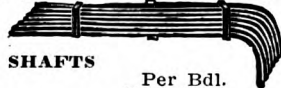
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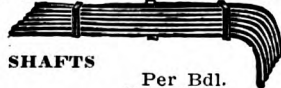
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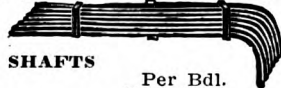
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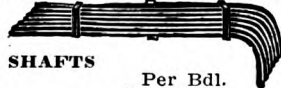
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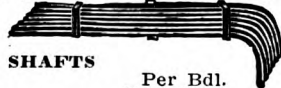
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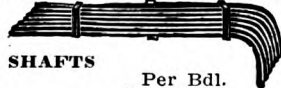
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AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N. Y., U.S.A.

MARCH, 1916

\$1.00 A YEAR
10c. A COPY



Every Tire Setting Shop Needs This New "West" Tire Setter

Here is a new member of the "West" Hydraulic Tire Setter Family—the Junior No. 1 Special.

A real "West" machine in every way but somewhat lighter and takes up less space. Consequently it can be sold at a much lower price.

This Junior Outfit is made for setting tires 4 in. x $\frac{5}{8}$ in. or 3 in. x $\frac{3}{4}$ in. and all lighter sizes including buggy tires; wheels of 54 in. diameter down to 30 in. Two hand pumps are furnished, one having a large cylinder and low pressure, the other a high pressure pump with small cylinder. The outfit also can be equipped with a power pump if desired.

The complete details of this "WEST" Junior Setter will interest you—write for them TODAY.

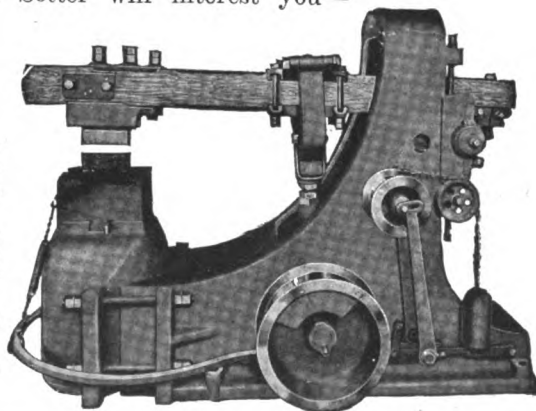
Why Not Put In Your Rochester Helve Hammer This Spring?

Now is the time to get away from slow sledge swinging and turn out your work with that dash and dependability which comes only when the Smith has the aid of a Rochester Hard Hitting Helve Hammer.

With this hammer you can weld tires in fine shape—a class of work that can't ordinarily be done with upright hammers. Its extra heavy anvil, steel base and fine hickory helve means years of **satisfactory service**.

One of the six sizes in which this hammer is made will just fit in with the requirements of your shop.

Find out which one it is—write for our helpful catalog at once.

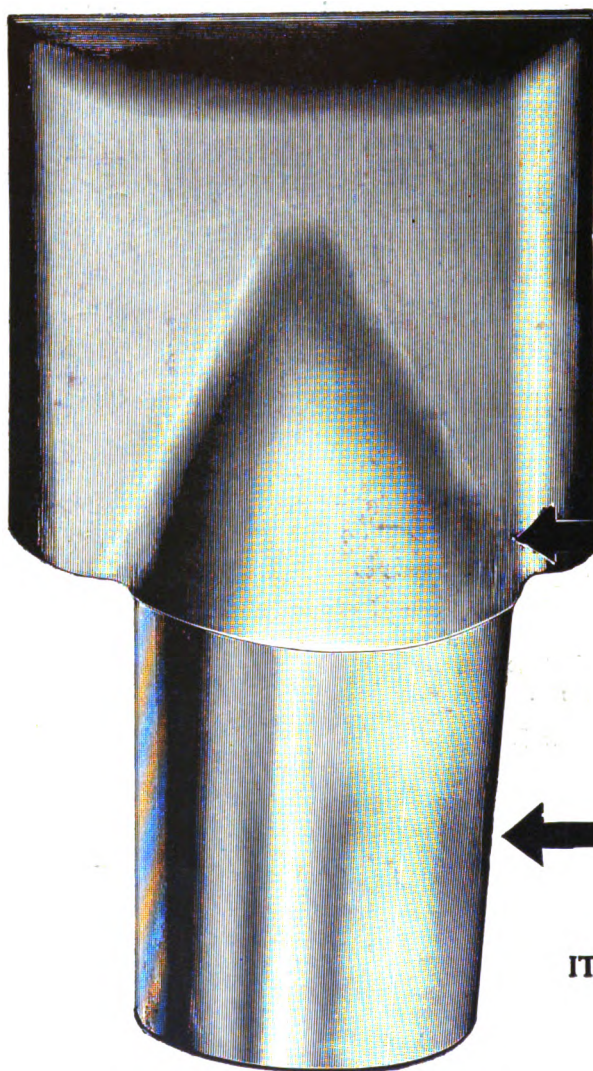


THE WEST TIRE SETTER COMPANY
ROCHESTER, N. Y.



IF YOU HAVE USED
Rowe Drive Calks

LAST WINTER WE DO NOT HAVE TO TELL
YOU ANYTHING MORE ABOUT THEM



IF YOU USED SOME OTHER
KIND OF CALK

LOOK



At that Blade

IT WEARS JUST RIGHT

LOOK



At that Hump

THE CALK CAN'T BREAK

LOOK



At that Shank

IT FITS THE SHOE AND WILL
NOT FALL OUT

Write us Today for Analysis of Steel and
Sample of Calk

THE ROWE CALK COMPANY

PLANTSVILLE, CONNECTICUT

WE SELL THROUGH BLACKSMITH SUPPLY HOUSES ONLY

APR 14 1916

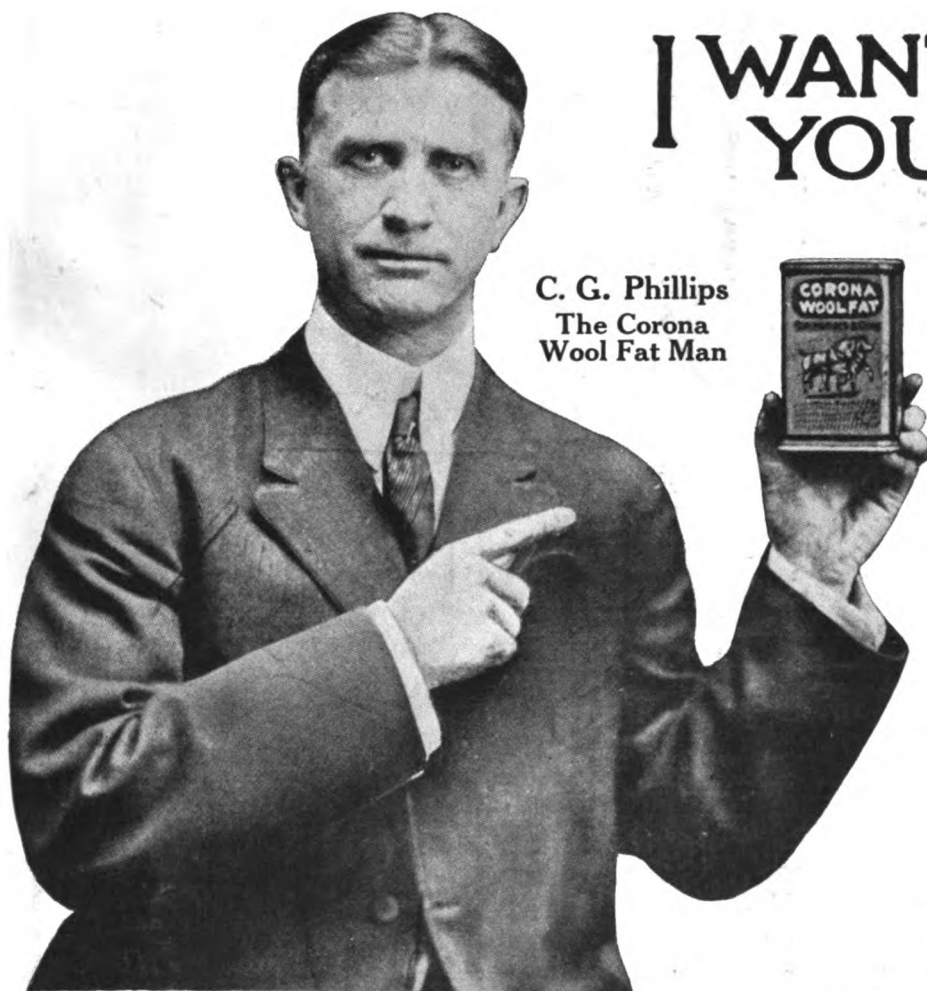
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C. G. Phillips
The Corona
Wool Fat Man

I WANT TO SEND YOU THIS

50¢ CAN
OF
CORONA
FREE

I KNOW CORONA—I KNOW WHAT IT
WILL DO FOR CATTLE AND HORSES
AND I KNOW WHAT IT WILL DO FOR
YOU AND YOUR BUSINESS.

THIS 50 CENT CAN IS WAITING FOR
YOU—I WANT YOU TO HAVE IT.

GIVE ME YOUR ADDRESS ON THE COUPON
TODAY AND WHEN I SEND THE CAN I WILL
TELL YOU HOW CORONA WILL MAKE MONEY
FOR YOU.

I want blacksmiths and horseshoers all over the country to act as my agents. CORONA is a money maker for the horseshoer. I know what I'm talking about. If I didn't, would I back up CORONA with such a strong guarantee? Would I offer you a 50c can for free trial if I didn't know that CORONA is positively the best article of its kind on the market today? I stand back of every can, just as I stand here holding out this free can for you.

Be the first in your town to look into this money making proposition. Try out the 50c can I offer to send you and then judge accordingly. Will you give me a chance to prove CORONA to you?

CORONA MFG. CO.

Lock Box "A"

KENTON, OHIO

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Name.....
Address.....
The name of my Iron Store Jobber is.....



"BUFFALO" BLACKSMITH TOOLS

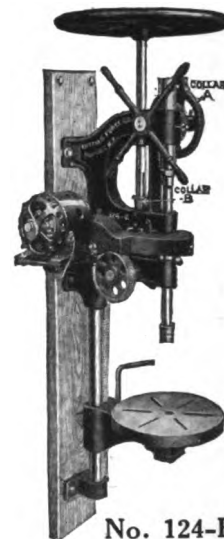
THE BLOWER WITH A CONSCIENCE



No. 200 Hand Blower
Sizes, 12, 14 and 16 in. Sold
with a 10-Year Guarantee.



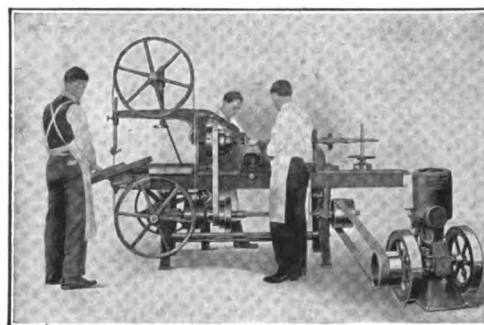
No. 2-E Variable Speed Electric Blower



No. 124-E
Drills $1\frac{1}{2}$ -inch holes with
 $\frac{1}{2}$ H. P. Motor.
Gear Guard Furnished Free.



"Banner" Upsetter
Capacity, 4 x 1 inch.



**"Buffalo" Crain Combination
Woodworker**

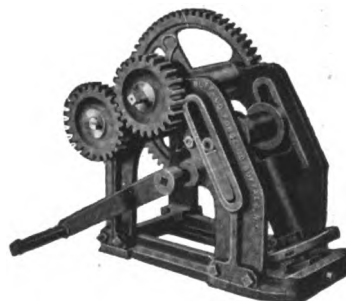


No. 5.
Punch, Shear and Bar
Cutter
Punches $\frac{3}{4}$ x $\frac{1}{2}$ inch.
Cuts Flats, 6 x $\frac{5}{8}$ inch;
Rounds, 1 inch.

You can do it better with a "Buffalo."



No. 228-E
Size, 32 x 44 inches.



Tire Benders
Capacities up to 8 x $1\frac{1}{2}$ inches.



No. 650
Size, 28 x 40 inches.

If Interested, Write For Our
General Catalog No. 179-1

Buffalo Forge Company

Buffalo, N. Y., U. S. A.

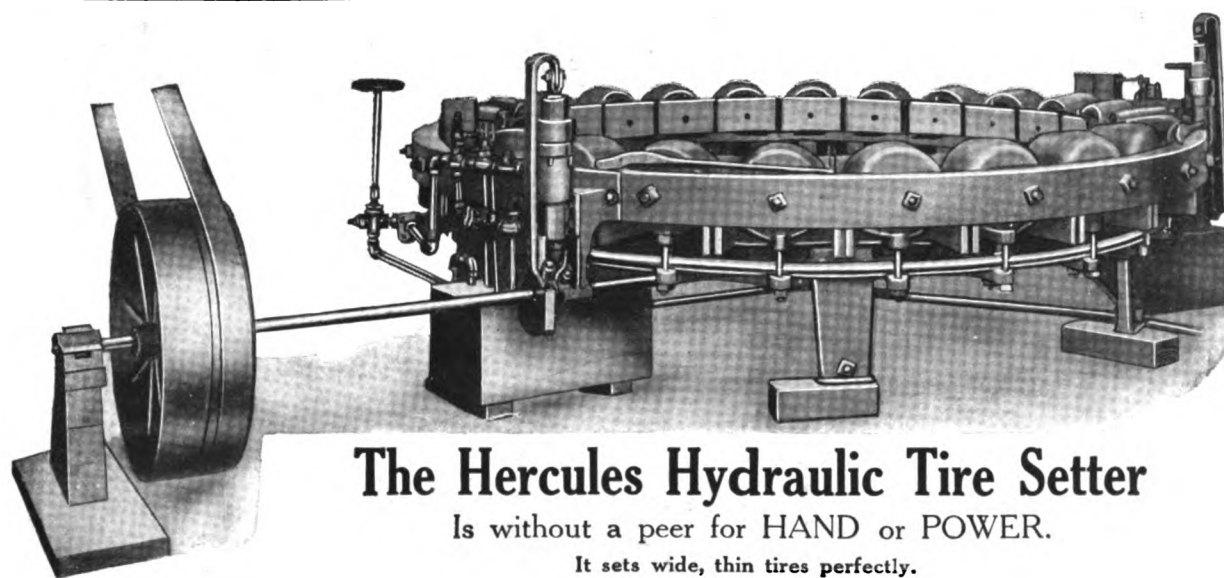
AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y., U.S.A.

MAY, 1916

\$1.00 A YEAR
10c. A COPY



The Hercules Hydraulic Tire Setter

Is without a peer for HAND or POWER.

It sets wide, thin tires perfectly.

The Special No. 3 sets tires 4" x $\frac{5}{8}$ ", 3" x $\frac{3}{4}$ " and all sizes less, on wheels 30" to 56" high.

To all **BLACKSMITHS** answering this advertisement we will offer prices on this machine \$100.00 less than ever before, notwithstanding the high cost of material.

No Smoke
Forge Hoods



Cast Iron Body.
Wrought Steel Wings.
Send for Circular

Save
Time
Tire-Bolts
Hot Work
and
Hard Work
by using one
of our
Hydraulic
TIRE
SETTERS



The Scientific

Is the standard edge grip
tire setter of the world.

Send for Circulars and Prices

No Smoke
Forge Hoods

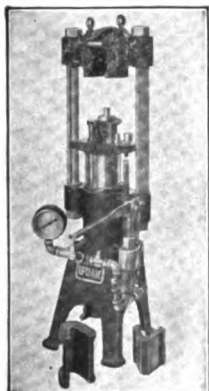


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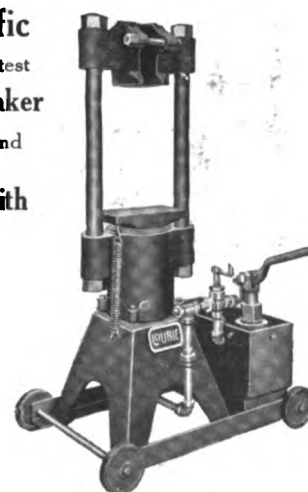
The
Scientific
is the greatest
Money-Maker
to be found
in a
Blacksmith
Shop

It will pay **BLACKSMITHS** to write to us for
PRICES and **TERMS** of the machines
we manufacture.

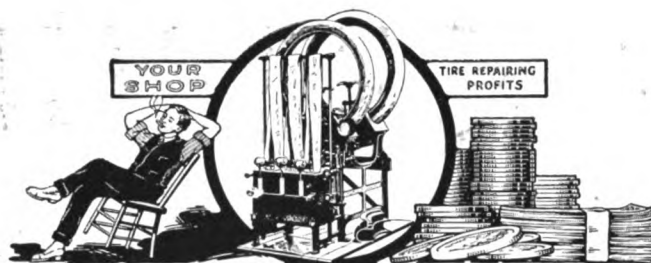
Lourie Manufacturing Co.
Springfield, Ill., U. S. A.



Hydraulic Arbor Presses
Any width between
posts.
Any pressure capacity.



Hydraulic Arbor Presses
Many Styles and Sizes



TURN THAT IDLE TIME INTO MONEY

Hundreds of Blacksmith Shop owners in every part of the country have reduced their overhead costs—found the way to big profits through Tire Repairing in the spare moments that would otherwise be wasted. Car owners in your neighborhood are spending thousands of dollars every year for tire repairs. You can easily get a good share of this business if they know you have the best and most practical equipment.

Akron-Williams TIRE REPAIR OUTFITS

**Used and endorsed by more than 60 leading
Tire Manufacturers.**

(Names furnished on request)

Akron-Williams Tire Repair Equipment is used by more than 90% of the leading Tire Manufacturers, in their factories and branches; it is recommended and sold by them to their dealers. Could there be any higher proof of its superiority over all others?

WRITE TODAY FOR NEW BOOKLET

We have just published a new booklet that is brimming full of interesting facts and figures on Tire Repairing. It gives you details of our plan for helping Akron-Williams Users get started on a paying basis from the very first day. Now is the time to get into Tire Repairing. Every day you delay means another big opportunity lost. Write us at once.

The Williams Foundry & Machine Co.
Greene Street Akron, Ohio.



Sense and Sentiment About Horse Shoes

WHEN it comes to profits, all horseshoers have plenty of practical sense; when it comes to horses, all horseshoers have more or less sentiment; the horseshoer who has the most of both uses

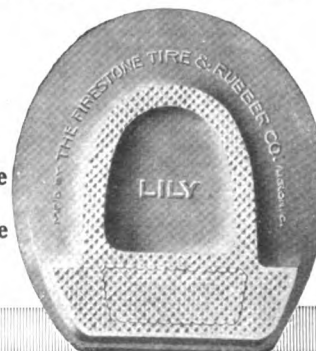
Firestone HOOF PADS

More Firestones are sold than all other hoof pads combined, because horseshoers realize that they lead in getting business and holding it.

Firestone Hoof Pads provide a sure hold, with means for the hoof to expand and contract as nature intended. Safe, sure, satisfactory. For particulars write your jobber or address

Firestone Tire and Rubber Company
Akron, Ohio Branches and Dealers Everywhere

Turn
Foot-Sore
to
Foot-Sure



Styles
for
All
Needs

AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y., U.S.A.

JUNE, 1916

\$1.00 A YEAR
10c. A COPY

THE BEST IS NONE TO GOOD FOR YOU

No matter whether you want to use it yourself or whether you are going to give it to your customers.

RING-POINT CALKS ARE BEST

Read carefully what we have to say to you and you will know not only *that* they are best, but also *why* they are best.

You all know that a self-sharpening calk is based on the idea of having a hard center surrounded by a soft outside. This soft outside quickly wears away on snow or ice leaving the sharp steel center protruding and your calk is always sharp.

If you cannot rely on your calk to always have this hard, sharp center it is not much good to you or to your customer. It might leave him with his horse unprotected against slipping at a time when that protection is most needed and of the utmost importance. This is just what will happen with other calks. They are liable to lose that center a few hours after they have been put on a horse's feet. That is not the case with ROWE Calks.

The Center of a Rowe Calk Can Not Fall Out

This center is made from the finest tool steel, it is hard and tough, so that the calk will wear long, but will not break. It is wedge-shaped and welded firmly to the soft outside shell. It runs all the way through the calk from end to end so that the calk will do its work up to the last moment. There is always a sharp point to every ROWE Calk, even if it is worn way down to the shoulder.

If you are interested in getting calks that give the best service, write us and we will show you how to make a sure test.

Remember also, that not only you get better satisfaction from ROWE Calks than from any other make, but you also get more PROTECTION from the Rowe Calk Company than is given you by any other calk manufacturer.

We Sell to Blacksmiths' Supply Houses Only

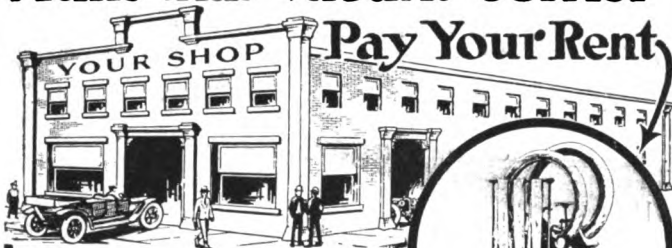
Do you realize what that means? That means that ROWE Calks are sold only to such jobbers who will recognize the horseshoer, and know that he is entitled to his share of the calk business and who will not sell calks over his head direct to the horseowner and thereby eliminate his profits.

We are real friends of the Horseshoers and our sincerest wish is to be rewarded in turn with their friendship.

THE ROWE CALK COMPANY
PLANTSVILLE, CONNECTICUT.



Make that Vacant Corner Pay Your Rent



Akron - Williams Tire Repair Equipment Will Do It

Car owners in your neighborhood are spending thousands of dollars every year for tire repairs. Every motorist is anxious and willing to have his tires repaired—kept in the best of condition, till the last bit of mileage has been taken out. He'll gladly give you the business if he knows you have the best and most practical equipment.

AKRON-WILLIAMS Tire Repair Outfits

Used and Endorsed by 60 Leading Tire
Manufacturers

(Names furnished on request)

Akron-Williams Tire Repair Equipment is used by more than ninety per cent. of the leading Tire Manufacturers, in their factories and branches; it is recommended and sold by them to their dealers. Could there be any higher proof of its superiority over all others?

YOUR SUCCESS IS ASSURED

We don't sell you an Akron-Williams Outfit and leave you to work out your own salvation. We help you get started on a paying basis; we supply you with forms for business letter-heads—stationery and envelopes—printed matter and merchandising plans that bring the business your way—that assure big success from the very start.

Write for New Booklet No. 45—Just Published

It gives you facts and figures on the Tire Repairing Business; shows you how an Akron-Williams Outfit brings more customers—means bigger business and bigger profits for you. Don't delay—grasp this opportunity—write for booklet at once.

The Williams Foundry & Machine Co.
AKRON, OHIO

Shop Equipment & Tools

Automobile Supplies
and Accessories

For the

DEALER

GARAGE

BLACKSMITH

LARGEST STOCK
QUICK SERVICE

REPAIR SHOP



ESTABLISHED 20 YEARS

THE BECKLEY - RALSTON CO.

(Wholesale Only)

1803 Michigan Boulevard,

::

CHICAGO

OUR MONTHLY "BUYER'S GUIDE" keeps you in touch with the market—latest prices, new goods and special bargain lists. Do you receive it each month? A postal will bring it.

ON WOOL FAT

The very name of Wool Fat is self-appealing. Mention the name to one who has the least idea of its healing and soothing virtue and this is enough to interest.

CORONA WOOL FAT, as compounded by us, is a positive cure for Thrush, Scratches, Grease Heal, and also it will, more quickly than any other ointment known, heal Sore Shoulder and Collar Gall, cure Sore Teats of a cow.

And, mark this well, CORONA WOOL FAT will keep the hoof of a horse in the most healthy condition. Quarter or Toe Crack or Contraction will not appear when it is used. CORONA WOOL FAT is positively the greatest remedy, both preventative and corrective, known. We want to hear from you all; we'll easily convince you that there's money and all other kinds of satisfaction keeping CORONA WOOL FAT in stock for your own and customers' use.

CORONA MFG. COMPANY,
Kenton, Ohio.

AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y., U.S.A.

JULY, 1916

\$1.00 A YEAR
10c. A COPY

BETTER COUPONS and MORE COUPONS

ARE PACKED WITH
GOLDEN RUSTLESS
RING-POINT CALKS
THAN WITH ANY OTHER CALKS ON THE MARKET

By placing your order now for ROWE CALKS you not only cover your requirements for the sharpening season with the best grade of calk obtainable, but you also get in line for a lot of handsome and valuable premiums which cost you nothing.

These are the same coupons that are given out by the United Cigar Stores, and can be exchanged for the same beautiful premiums.

There is a large quantity of these premiums to select from and you are sure to find something either for yourself or your wife or your family.



These coupons are also redeemed at our factory for taps, drills, tapping machines, punches, extractors, and last but not least, for elegant stationery imprinted with your name and address.

You can get bill heads in three sizes, letter heads, statements and envelopes of better quality and of handsomer design than ever before.

SEND TODAY FOR ILLUSTRATED PREMIUM CATALOGUE
and for the new
ROWE HORSESHOERS PRICE LIST

You will find a lot of valuable and interesting information therein

The Rowe Calk Company
PLANTSVILLE, CONNECTICUT.



Akron-Williams

Tire Repair Equipment

A Size for Every Garage



All These Tire Manufacturers and Others Use and Recommend Akron-Williams Tire Repair Equipment

Acme Rubber Mfg. Company.
 Ajax-Grieb Rubber Company.
 Akron Tire Company.
 Alliance Rubber Company, The
 American Tire & Rubber Company, The
 Bucyrus Rubber Company, The
 Chester Rubber Tire & Tube Company.
 Cincinnati Rubber Mfg. Company, The
 Combination Rubber Mfg. Company.
 Dayton Rubber Mfg. Company, The
 Diamond Rubber Company, The
 Dominion Tire Co.
 Dunlop Tire & Rubber Goods Company, Limited.
 East Palestine Rubber Company.
 Empire Rubber & Tire Company.
 Endurance Tire & Rubber Company.
 Falls Rubber Company, The
 Federal Rubber Mfg. Company.
 Firestone Tire & Rubber Company.
 Fisk Rubber Company.
 G. & J. Tire Company.
 General Tire & Rubber Company.
 Goodyear Tire & Rubber Company.
 Giant Tire & Rubber Company.
 Goodyear Tire & Rubber Company, of Canada.
 Goodrich Company, B. F., The
 Gutta Percha & Rubber, Limited.
 Hamilton Rubber Company.
 Hood Rubber Company.
 Independent Tire Company.
 Indiana Rubber & Insulated Tire Company, The
 Kelly-Springfield Tire Company.
 Knight Tire & Rubber Company.
 L. & M. Rubber Company, The
 Lee Tire & Rubber Company.
 Manhattan Rubber Mfg. Company.
 Mansfield Tire & Rubber Company, The
 Marathon Tire & Rubber Company, The
 Midgley Tire & Rubber Company, The
 Miller Rubber Company, The
 McGraw Tire & Rubber Company, The
 McNaull Auto Tire Company, The
 Mohawk Rubber Company, The
 Morgan & Wright, Inc.
 National Tire & Rubber Company, The
 Pennsylvania Rubber Company.
 Perfection Tire & Rubber Company.
 Portage Rubber Company, The
 Racine Rubber Company.
 Republic Rubber Company, The
 Rubber Products Company, The
 Rubber Step Mfg. Company.
 Rutherford Rubber Company.
 Seamless Rubber Company, The
 Southern Tire & Rubber Company.
 Standard Tire & Rubber Mfg. Company, The
 Swinchart Tire & Rubber Company, The
 Ten Breck Tyre Company.
 United States Tire Company.
 Victor Rubber Company, The

We Offer You the Same Repair Outfits These Manufacturers Use

These manufacturers know what is best, they choose Tire Repairing Equipment on the basis of results only. And the same reasons that influence their purchase of Akron-Williams Equipment will enable you to make bigger profits with an Akron-Williams than with any other kind of an outfit.

Right today get our plan to help you get into the Tire Repairing Business on a big paying basis. We've just published a new catalog listing everything for the Tire Repairman. Your copy is ready and waiting. Write for it today.

The Williams Foundry & Machine Co.

Green St.,

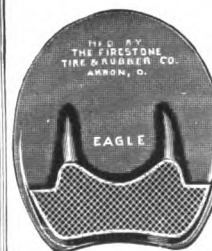
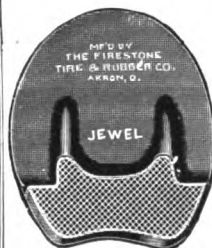
Akron, Ohio.

Exclusive Distributors for California, the Waterhouse and Lester Co., San Francisco



Firestone

Hoof Pads



MAKE EASY,
 sure going for
 the horse and
 profitable trade for
 the horseshoer.

Horse owners have found it good economy to prevent soreness—to prevent the loss of the horse's services by a timely use of Firestone Hoof Pads.

Meet the demand. Win friends and customers quickly by using Firestone. The Firestone reputation is back of them—Firestone quality is in them—Firestone name is on them. None genuine without it.

**Write Your Jobber
 for Prices**

Firestone Tire and Rubber Co.
 Akron, Ohio—Branches and Dealers Everywhere

AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y., U.S.A.

AUGUST, 1916

\$1.00 A YEAR
10c. A COPY



GOLDEN RUSTLESS Ring-Points are The Best Calks



But they are by no means the only good calks which we make.

ROWE CALKS OF ALL KINDS ARE LEADERS

in their respective classes. The Welded Tool Steel Center is the reason for that. It makes the calk wear longer, wear sharper and give more satisfactory service than any other Screw Calk.

Rowe Calks Are Always Ready for Service, Because the Hard Center Cannot Fall Out

In many cases a shorter calk is preferred by the owner of a good horse. Recomend to him our

Ring-Point Pad Calks

and you will have a friend for life. Don't forget that we also make ROWE JUNIOR CALKS, with square or round shoulders, BLUNT or MUD CALKS, RACING CALKS and last but not least the

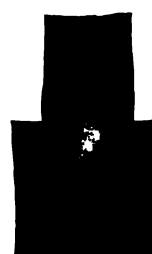
Famous Rowe Drive Calks

Our new Blacksmiths' price list is now out. Write us for a copy to-day also for samples and free advertising helps.



The Rowe Calk Company

Plantville, Connecticut





AKRON-WILLIAMS

Tire Repair Equipment



Developed by the Leading Tire Companies

EACH and every piece of Akron-Williams Tire Repair Equipment has been designed and brought to perfection with the active aid and co-operation of experts employed by the Akron Tire Factories—the largest in the world. These engineers work side by side with us to develop the most efficiently Tire Repair Outfits, *firstly*, to use in their own factories, and *secondly*, to sell and recommend to their dealers and agents throughout the country.

As a result, Akron-Williams Tire Repair Equipment is always the latest and most improved. The Repair Outfit we offer you is the same in every way as used, sold and recommended by more than 60 leading Tire Manufacturers.



An Akron-Williams Tire Repair Outfit is built to turn out a large quantity of high-grade work. There's a big profit for you on every job and the cheerful recommendation of your customers is bound to boom your business from the start.

Get Into the Tire Repair Business

Over three million cars will be in use this year; one hundred million dollars is a conservative estimate of the sum that owners will pay for tire repairs. Tire Repairing is your best chance for big money, either as a separate business or as a department of a garage. *Your success depends absolutely on the equipment you choose.*

Grasp this opportunity NOW. Write us for copy of free booklet 246 telling of possibilities in Tire Repairing for the man with small capital.

"Everything for the Tire Repair Man"

Just out—our new catalog illustrating full and complete line of tire repair machinery, equipment, tools, etc., for every size shop. Brimful of new time and labor-saving devices. Write for it today.

The Williams Foundry and Machine Company

Green Street

Akron, Ohio

Exclusive Distributors for California:
THE WATERHOUSE & LESTER COMPANY,
San Francisco

We Help You Sell Firestone Carriage Tires

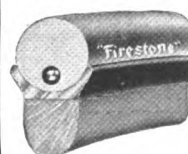
FIRESTONE service just begins when we deliver the stock to you. We help you reach every possible tire user within reach of your store. The Firestone Sales Co-Operation for Carriage Tire Dealers is a force of the best "salesmen" in the world calling on your customers. They work day and night. And their service is free to you for the asking. Our co-operation includes fine business stationery—free. Hand-some business cards—printed free. Special cloth signs—free. Circular letters mailed to your trade—postage the only charge. Fine art catalogs and folders, imprinted with your name and address—free. PICTURE SLIDES with your name and address—free. Special selling campaigns. Anything you need. Use our service to build up profits.

Firestone Quality Brings More Customers

Firestone Tires mean most miles per dollar for the user and most profit and satisfaction for the trade. They have maximum wearing power with buoyancy. They wear down to the wheel without repairs—cannot crumble or break—are shock-absorbing to the highest degree. Made in three styles—one for every requirement. Tire is full size, but lightest made. Write for prices and catalog.



Internal Wire

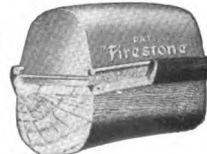


Cushion

Firestone Tire and Rubber Company

"America's Largest
Exclusive Tire and
Rim Makers"

Akron, Ohio
Branches and Dealers
Everywhere



Side Wire



AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

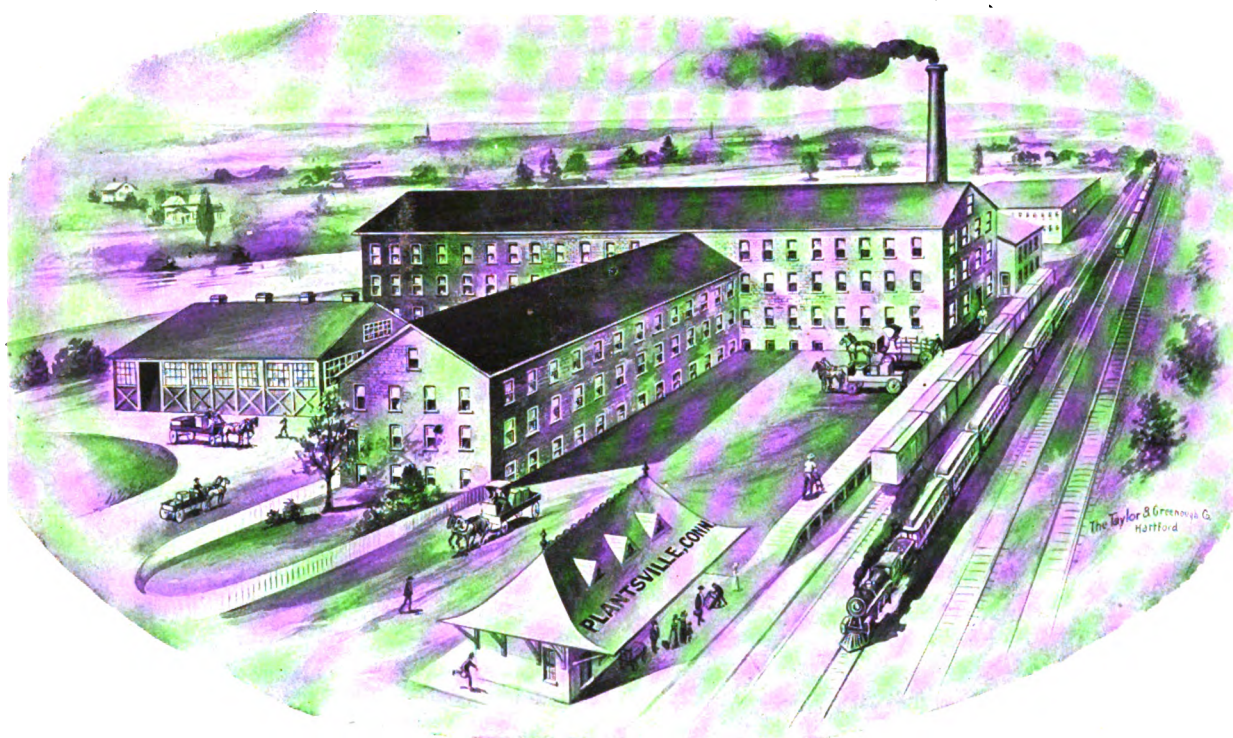
BUFFALO
N.Y., U.S.A.

SEPTEMBER, 1916

\$1.00 A YEAR
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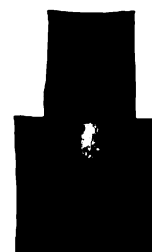
The New Home of
The Rowe Calk Company
.. at ..
Plantsville, Connecticut



Where the
Golden Rustless Ring-Point Calks
and the
Famous Rowe Drive Calks
Are Made

Write today for our New Catalogue. Also for Samples,
free advertising helps, and especially for the illustrated
premium list, telling all about the

Coupons Packed with Rowe Calks





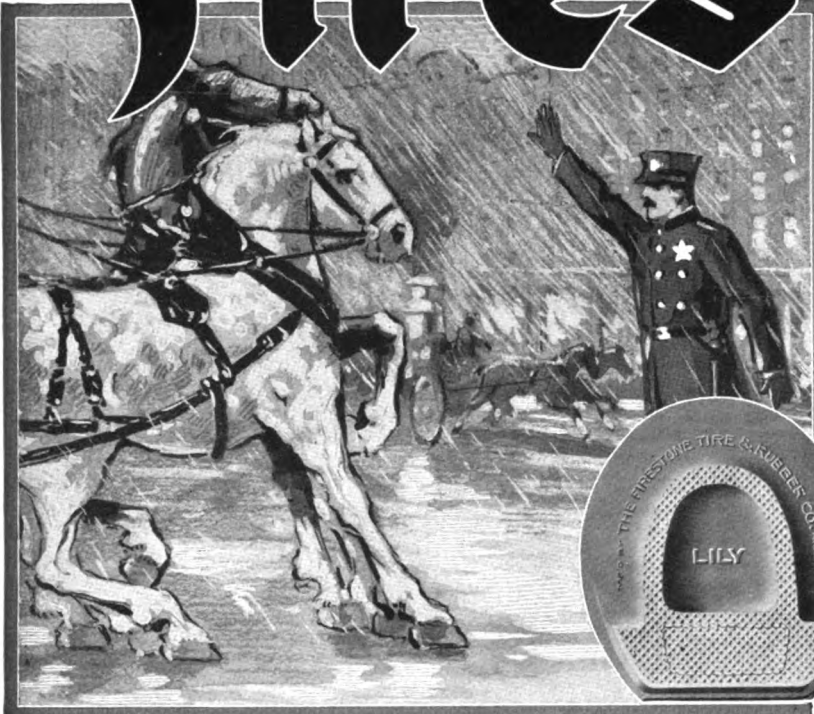
Firestone

HOOF PADS

THE man who has built up a big trade on service will add to his profits and good will by using Firestone Hoof Pads.

More of them sold than of all other makes combined. Many styles—one for every need. Write your jobber.

Firestone Tire and Rubber Company
Akron, Ohio
Branches and Dealers Everywhere



NORTON

ALUNDUM

Grinding Wheels for the Blacksmith

They last longer and work better and therefore are cheaper to operate because they are made of ALUNDUM, an electric furnace abrasive, whose hardness, sharpness and toughness can be scientifically controlled during manufacture.

It is thus possible for you to select the right wheel—one that has been especially made—for any particular class of your work.

In the blacksmith shop, where a wheel of all-around cutting quality is required, a properly selected Norton ALUNDUM Grinding Wheel will give satisfaction. For grinding ploughs, tools, automobile parts, steel castings, burrs on metal tires, horseshoes, etc., ALUNDUM Wheels most nearly approach the ideal.

If you are interested in polishing grain, our booklet, "POLISHING, What to USE—How to Use It", is well worth reading. A postal card will bring it.

ALUNDUM for steel and steel alloys. CRYSTOLON for cast iron, brass, bronze, etc.

NORTON COMPANY

Worcester, Mass., U. S. A.

Chicago Store 11 No. Jefferson St.

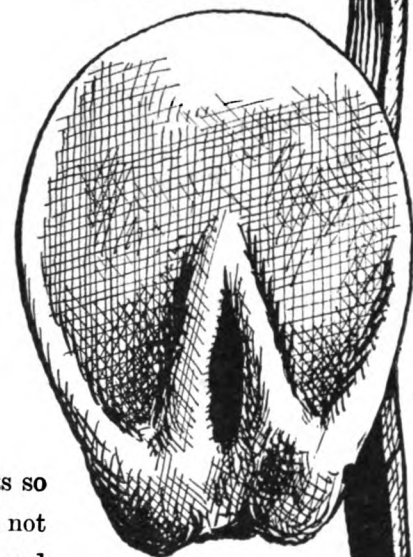
New York Store 151 Chamber St.



Which Kind of Frog Do You See Most?

Look at the frogs on the front feet of the horses you shoe and you'll find the great majority are in the condition pictured in the lower picture—tightly contracted over the foot bone so that the entire foot is malformed and presents a narrow, elongated appearance.

Yet if the horse had been left unshod and developed naturally the frog would have the normal, healthy appearance, free from contraction, like the frog shown in the upper picture. What would your customers give to have their horses feet restored to that condition? That's the great profit-winning service you can render with



Scranton Bar Shoes

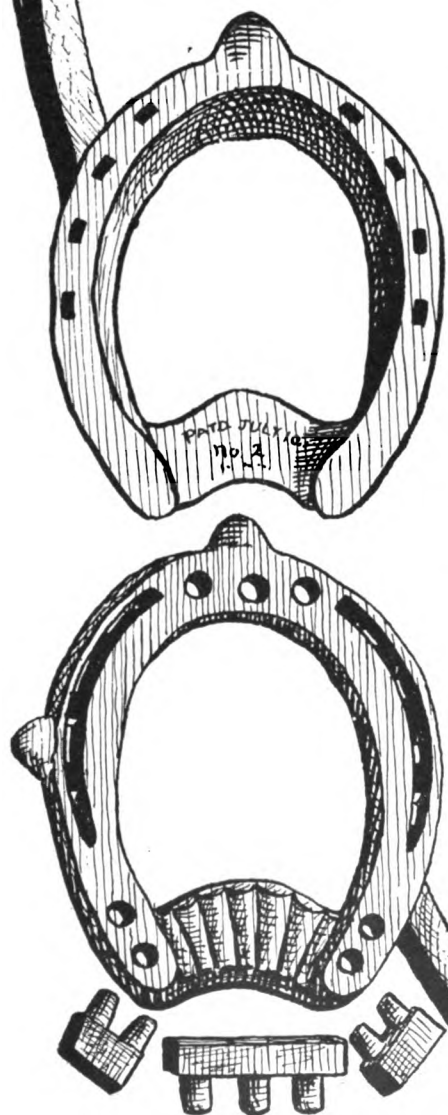
The trouble with the ordinary hand made shoe is that the bar sets so far back and is so narrow that there is not sufficient bearing to keep the frog soft and flexible unless leathers and dressing are used.

The Scranton Bar Shoe, forged in a die, horse shoe steel, obtains twice the amount of frog action. As the wide bar always is properly concaved with a level foot surface, it is twice as effective in expanding the contracted hoof. Disease is prevented and no other appliance is needed.

Note the corrugations in the bar. This allows widening the shoe without perceptibly widening the bar. Made with removable calks, the shoe can be recalked once or twice and therefore becomes no more expensive than the ordinary shoe.

You will find it pays in cold cash to use Scranton Bar Shoes. If your dealer does not carry them in stock, write us,

Scranton Forging Company
Scranton, Pa., U. S. A.





Shop Equipment & Tools

Automobile Supplies
and Accessories

For the

DEALER

GARAGE

BLACKSMITH

REPAIR SHOP

LARGEST STOCK
QUICK SERVICE



ESTABLISHED 20 YEARS

THE BECKLEY - RALSTON CO.

(Wholesale Only)

1803 Michigan Boulevard,

::

CHICAGO

OUR MONTHLY "BUYER'S GUIDE" keeps you in touch with the market — latest prices, new goods and special bargain lists. Do you receive it each month? A postal will bring it.

CRESCENT
WELDING
COMPOUND
TRADE MARK

TWO BIG HELPS
IN WELDING
DON'T BE WITHOUT THEM



"E-Z" Welding Compound

is the best BECAUSE it works equally good on all kinds of steel. It welds at lower heat than any other. It sticks to metal at a very low heat. It leaves no scale. Use it once and you will always want it.

Crescent Welding Compound

makes smoother welds than any other. It is fine for plow work or where parts are fastened together before welding, or for making split welds, finishing heats, or for welding under dies, etc., etc. It insures smooth finish and perfect welds on Toe Calks.

"Money back" from any jobber if "E-Z" or Crescent does not give perfect results.

We Will Send Samples Free.

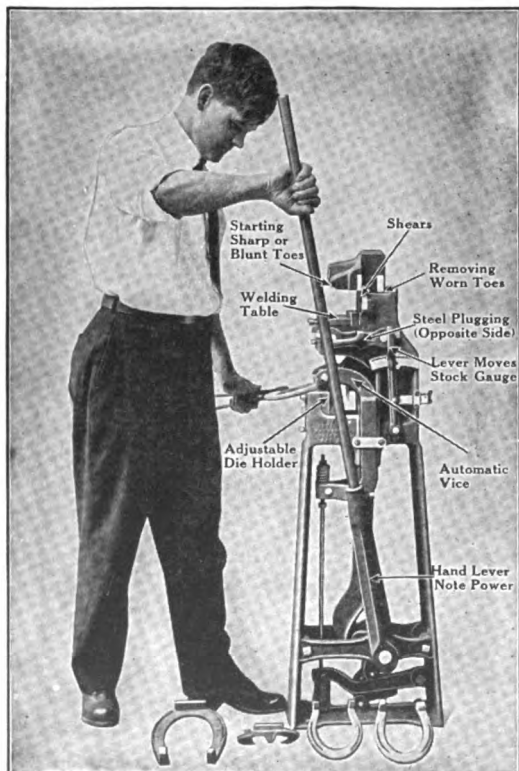
Made only by

Anti-Borax Compound Co.

FORT WAYNE, IND.

The Greatest LABOR SAVING
Machine on Earth

THE L. S. P. CALKING MACHINE

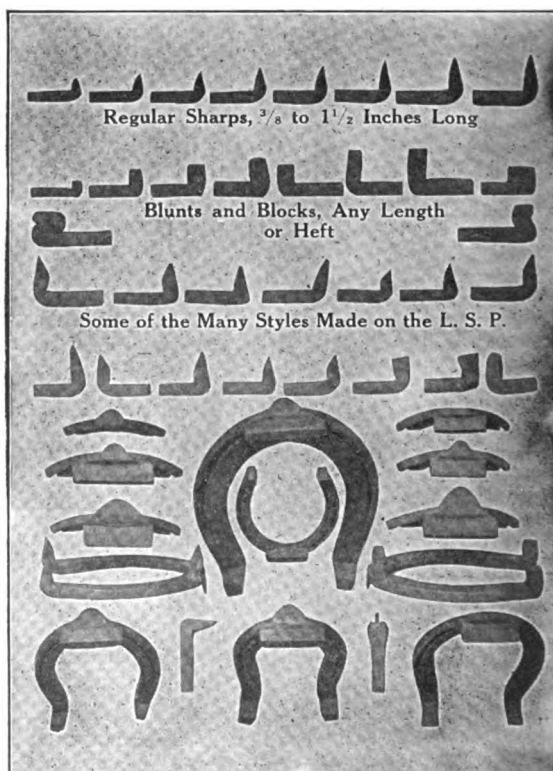


1916 MODEL—AN ENTIRELY NEW MACHINE.
Fully covered with Patents.

Our 1916 MODEL is far superior in every way to our former styles, doing a much larger range of work and a more finished job, much handier and easier to operate.

It is a strong, handsome, well-made machine, weighing 60 pounds more than our former style, but only takes up 8 x 15 inches floor space. No foot Treadle to bother, both feet on the floor. Automatic Vice which holds the shoe rigid. It does all kinds of Sharp, Blunt and Block Heeling. Starts the Toe Calks without use of hammer, removes the worn toes, welds Sharp and Blunt Toes, does Steel Plugging, rolls out a perfect, finished Clip. Work better than done by hand, with ease and in a fraction of the time. The Greatest Time and Labor Saving and Money Making Machine that ever went into a Shoeing Shop.

Write at once for
full description
and prices.



The above is an actual photograph of some of the work, just as it came from the machine without a hammer touching it.

L. S. P. CALKING MACHINE COMPANY

WYALUSING, PA., U. S. A.
NATIONAL MACHINE CO., BRIGHTON, ONT., CANADA



PHOENIX

Horse and Mule Shoes
are used by most Good
Shoers—because of
their better material—
are easier to fit and
more uniform than the
ordinary run of shoes

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SEPTEMBER, 1916



THE AMERICAN BLACKSMITH



7



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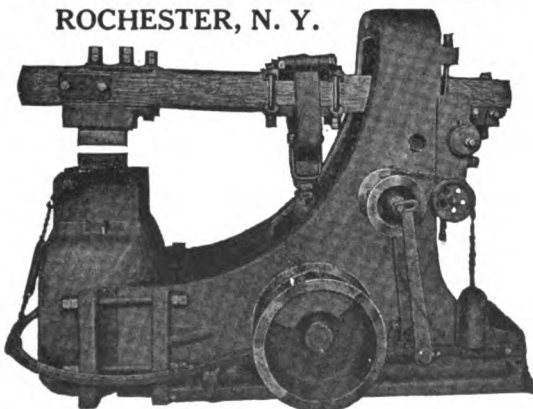
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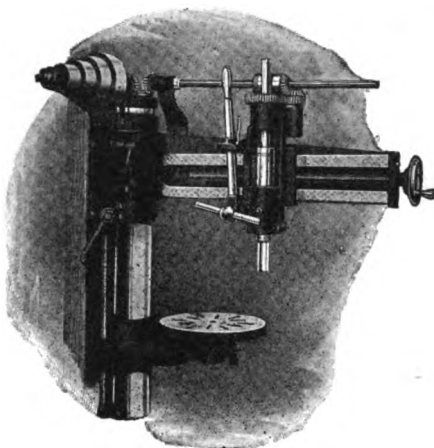
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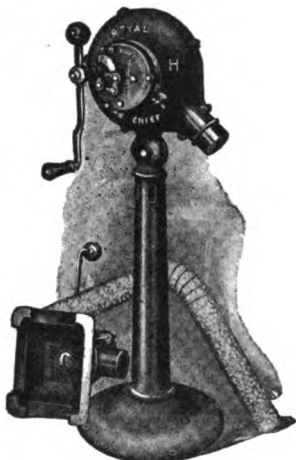
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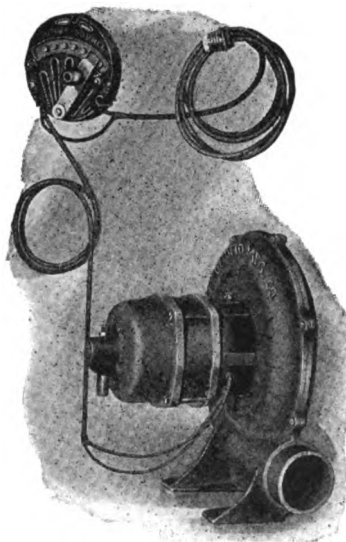
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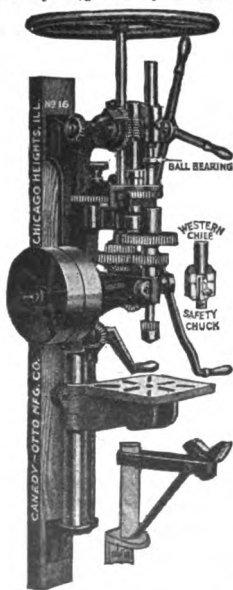
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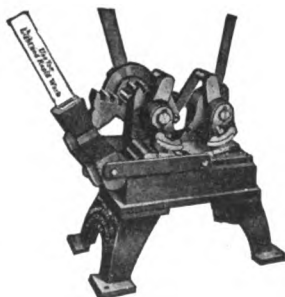
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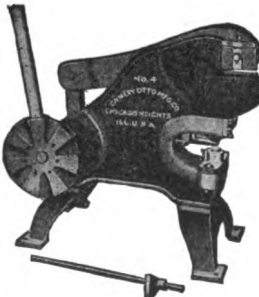
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Will shear up to ½ in. by 4 in. mild steel. Will punch up to ½ in. holes in ½ in. steel. Lever operates toward the front or back.

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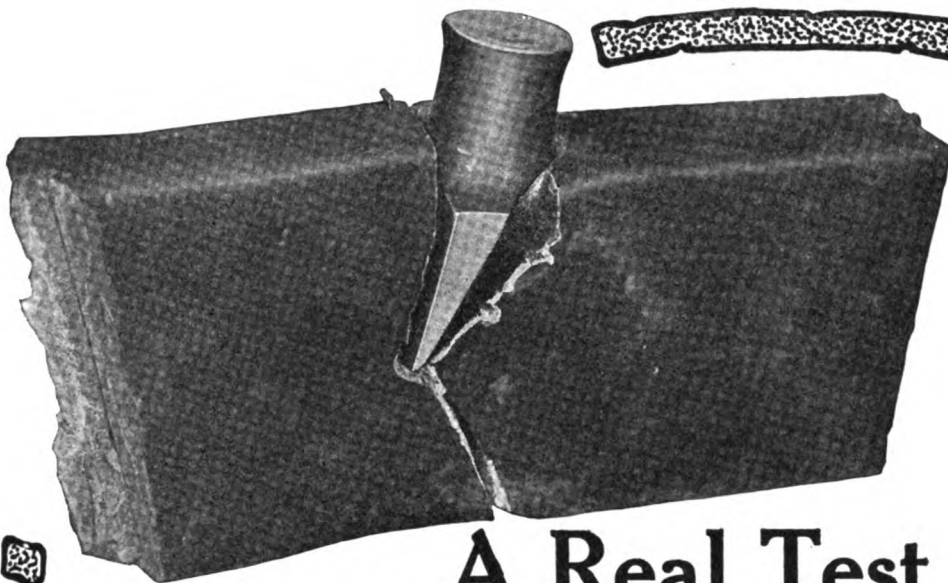
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State of Minnesota }
County of St. Louis } ss.

Carl Swanson, *Ed. Hamilton*

being duly sworn,
on oath, depose and say that they and each of them were personally present at a test and saw a Diamond calk driven into a bar of 1x3 Tool Steel, 80 point carbon, and that the blade of said Diamond calk showed no appreciable effect as a result of the afore mentioned test.

Carl Swanson, *Ed. Hamilton*

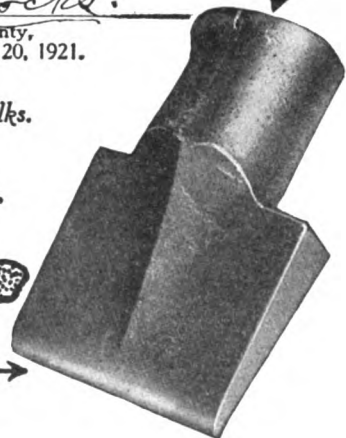
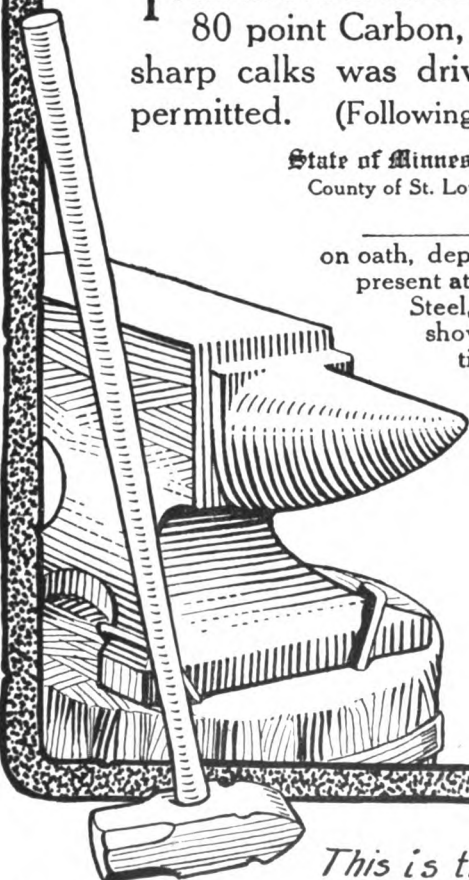
Subscribed and sworn to before me this day of August, 1916.

Norton Matlocks

Notary Public, St. Louis County,
My commission expires Mar. 20, 1921.

Only Horseshoers Retail DIAMOND Calks.
Ask for Illustrated Catalog and Price List.

Diamond Calk Horseshoe Co.
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Matlocks
This is the calk after the test

Look for photo of actual test in next issue.

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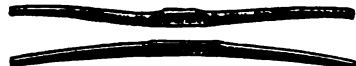
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Buggy and Surrey size..... Each 75c



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Assorted sizes 6 for 60c



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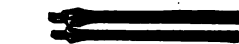
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Assorted sizes 14 for 60c



BUGGY AND SURREY SINGLE TREES
Assorted 6 for 60c



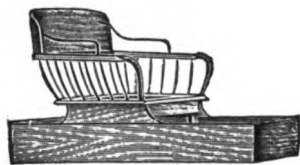
BUGGY SPOKES
Per 100
1 1-16 in., Sar. Pat.. \$2.95
1 1-16 in., C. B..... 2.25
1 7-16 in., Sar. Pat.. 3.50
15-16 in., Warner Pat. 1.25



WOOD HUB SPOKES
Per Set
2 in. .. \$2.00
2 1-4 in. . 2.30
2 1-2 in. . 2.75

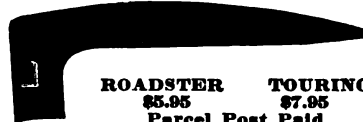


Auto Tops Roadster \$14.36
Auto Tops, Touring \$23.40
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\$5.90 and up

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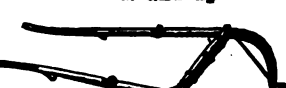
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No sewing.
Can be applied in an instant. Cost 80 cents and up. Parcel Post Paid. You can make 100% profit.



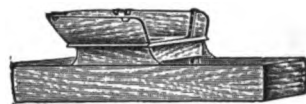
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Avoid delays in repairing broken Auto and Carriage wheels. Auto Spider, \$2.20 and up. Buggy Spider, \$1.10 and up.



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With Steel Tire on \$6.25 and up
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We make all sizes.
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Assorted sizes, 8 for 60c



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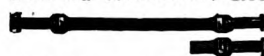
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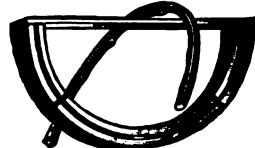
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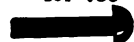
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We carry all sizes ..



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Plain Rims.. \$1.15 and up
Beveled Rims 1.40 and up
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10 pieces bored and rounded rims, assorted sizes, for 75c



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Assorted sizes
8 lbs. for 65c



DASHES

20 in. drill ... \$0.30
17 in. leather.. 0.45
22 in. leather.. 1.21
25 in. leather.. 0.95



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1,000 Assorted size Spoke Wedges ... 60c

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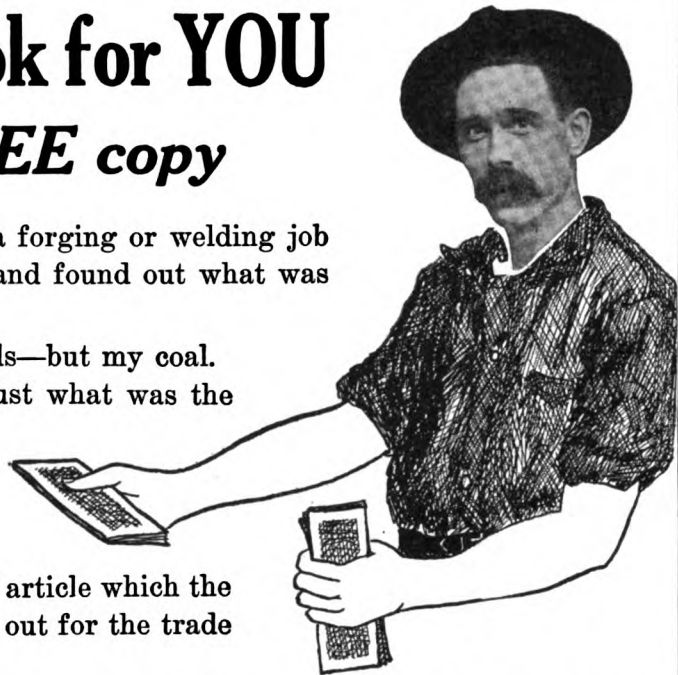
I used to have a pesky lot of trouble on a forging or welding job until I made a good hard study of the work and found out what was wrong.

It wasn't my stock—it wasn't my methods—but my coal.

Yet it took me a long time to find out just what was the matter with my coal. But after some hard efforts I finally mastered the problem.

Now I want to pass on my experience to my brother Blacksmiths and I've put down what I've learned on this coal matter in a brief article which the Pennsylvania Coal Company is kindly putting out for the trade as a **second number** of "Forge Fire Facts."

I feel I've found out a great many things the average Smith never realizes but would be glad to know, so here is my story, told in a Smithing way, and I will be glad to send you a free copy if you will just



Mail the Coupon at Once

Some of you Smiths have seen the rose forgings I make and others know me on account of some of my heavier work. You know a Smith must have pretty reliable coal to handle a variety of work like that.

I'm sure you can get a good many helpful tips from my book. As long as it won't cost you anything, wouldn't you like to have a copy?

All you need do is fill out the coupon and mail it TODAY.

(signed)

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COUPON

PENNSYLVANIA COAL & COKE CORPORATION,
Webster Selected Smithing Coal,
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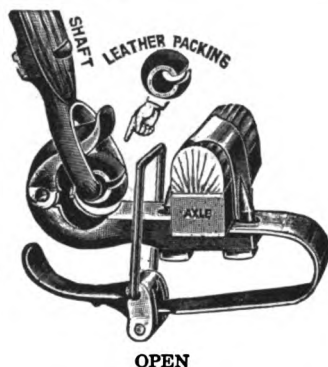
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THE BRADLEY BALL-BEARING Carriage Coupler



The Bradley Ball - Bearing Carriage Coupler is made entirely of steel.

Every part, except the flat spring and the loop, are steel forgings made from the bar under mighty drop hammers.

The flat spring is cut from high grade, crucible sheet steel, formed when hot and then carefully tempered and tested.

The loop is of special stiff steel wire.

Not a piece of malleable iron or other inferior or unreliable material is used.

The leather packings are in one piece and moulded to shape in machines made especially for this work.

The retaining rings keep the leather packings in place and are indispensable where shafts and poles are frequently removed.

Placing the loop over the end of the cap and drawing the thumb lever back against the flat spring closes the coupler, locks it and takes up any wear of the leather packing.

An absolutely non-rattling, quick-shifting carriage coupler.

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SYRACUSE, N. Y.

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THE BEST TOOLS TO ASSIST
IN YOUR WORK



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Showing

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Pa., U. S. A.**

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Sent Free.
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No. 12 Electric Sharpening Hammer

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Corrugated Pein prevents shoe slipping
from anvil, making every blow count.

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Correctly Tempered
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They All Sell Them.

Write for descriptive circular and prices.

C. D. EDWARDS



Albert Lea,
Minn.



THE IMPROVED EASY HOOF TRIMMER
Will cut a hoof easier, quicker and better
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2½ pounds, opening, 2 inches, cuts one
inch. Thousands of shoers are using the EASY
HOOF TRIMMER with great satisfaction.

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Delivered to any part of the U. S. by
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The
Spring Breakage

It's poor policy to risk repeating the annoyance
of a broken or weak spring—and the delay—by say-
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Don't replace a broken spring with one no better.

Wise dealers—sell only the best—

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New Era Spring & Specialty Co.
859 Woodward Ave. Detroit, Michigan

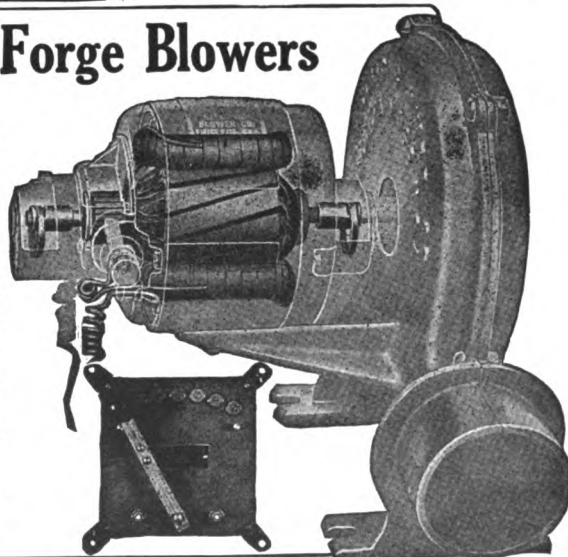
"MARVEL" Forge Blowers

This cut shows you the
RING OIL BEARING design
and construction of the mo-
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FIRE" \$28.00 MARVEL and
and on our No. 23 MARVEL
\$25.00 Blowers, the windings
being different.

Note the large oil rings
which revolve with the
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keeping it running in a per-
fect bath of oil on the bear-
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means long life.

Shipped on 30 days' trial
through your dealer.

Electric Blower Co.
Boston, Mass.



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or if the threads are
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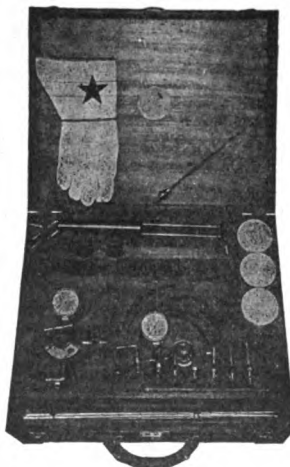
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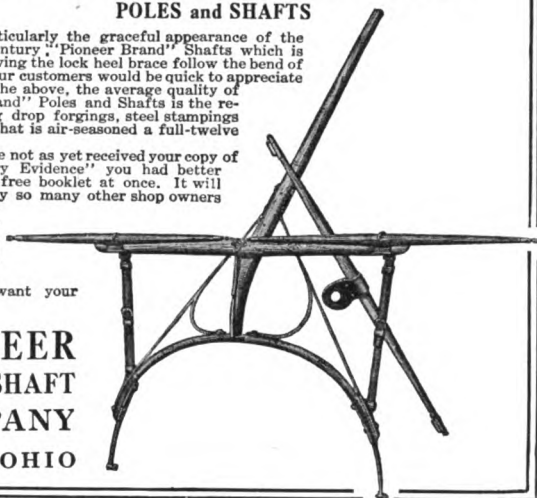
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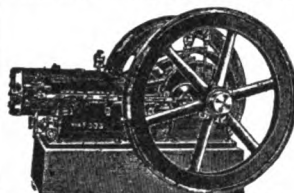
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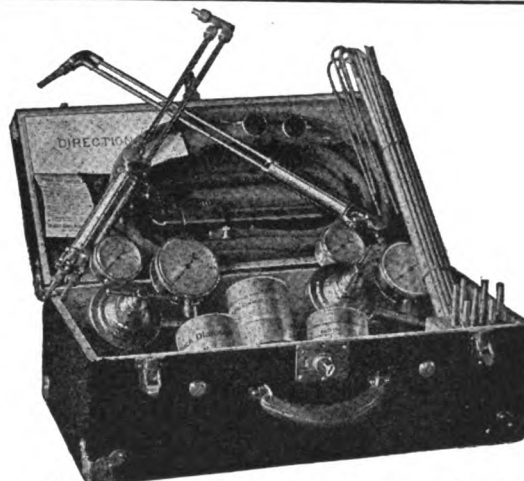
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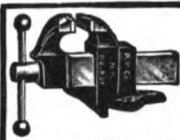
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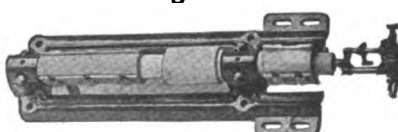

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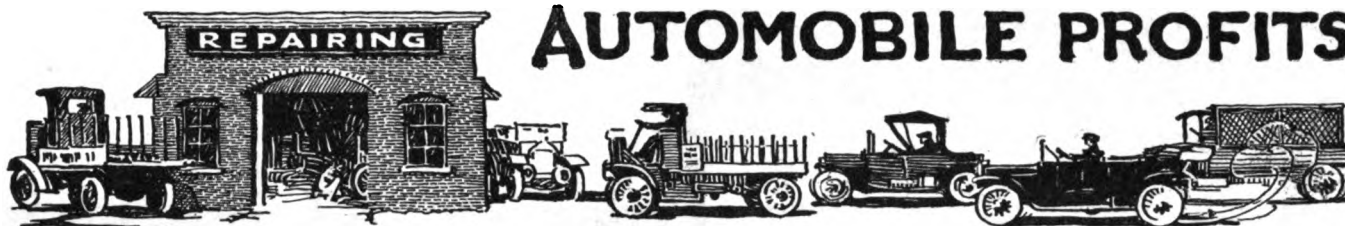
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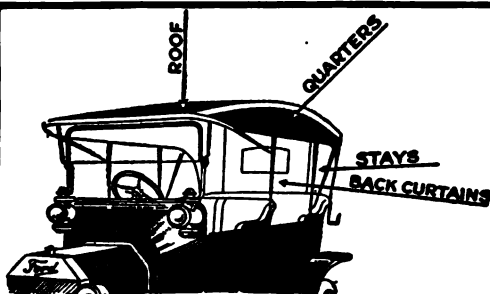
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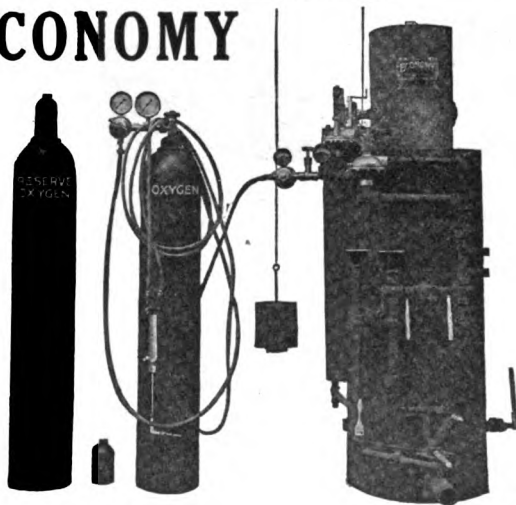
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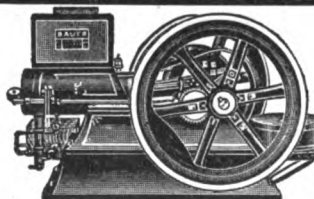
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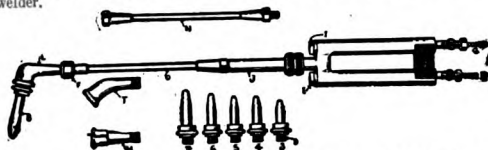
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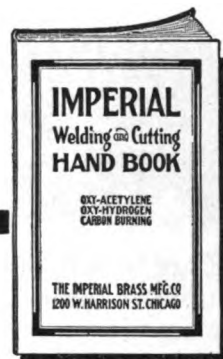
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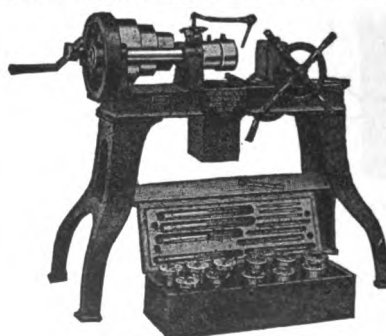
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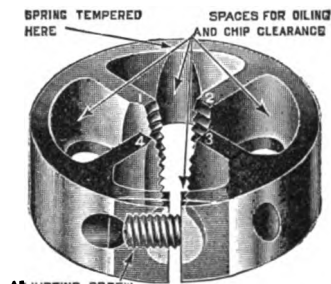
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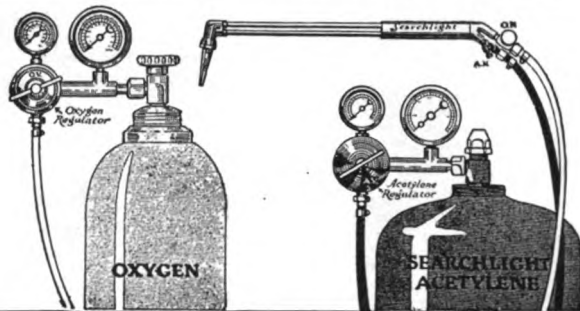
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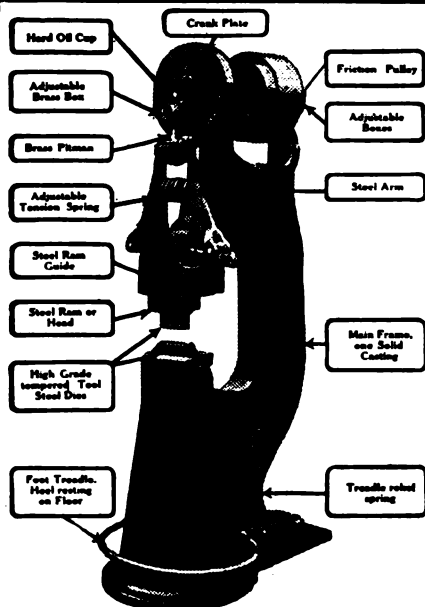
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I have showed hundreds of Smiths how to put more dollars in their pockets each week without doing enough extra work to notice it. I can do the same for you if you will

SEND FOR A FREE SAMPLE OF CORONA

and test it yourself on the sorest hoofs that come in your shop. You'll see results almost immediately—just tell your horse owning customers how you proved it yourself and you will have quick sales at extra profits well worth picking up.

Let me give you the start—let me satisfy you thoroughly that Corona will, in your own shop and under your own use, do all that I claim for it—cut out and mail the coupon now so that I can send the large, free sample and explain my liberal agency offer.

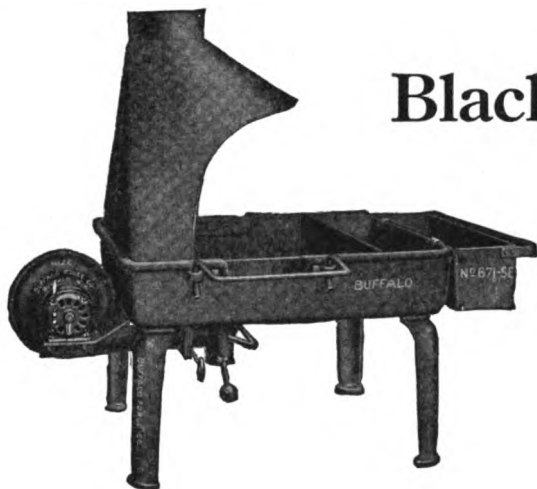
CORONA MFG. COMPANY
LOCK BOX, "A" - KENTON, OHIO.

Gentlemen—Please mail me one of your regular 50c cans of Corona for trial. If satisfactory, I shall be interested in the agency.

Name.....
Address.....
Name of my iron store jobber.....



Buffalo Blacksmith Tools



BUFFALO FORGE No. 671-SE

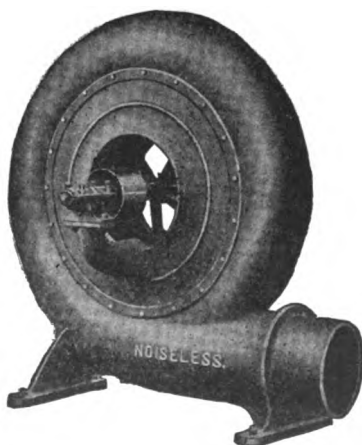
Arrangements can be made for trial of "Buffalo" Tools without expense for freight if returned.



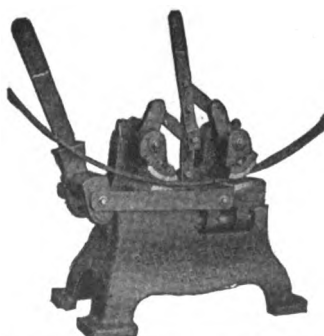
BUFFALO FORGE No. 228-E



BUFFALO "VULCAN" TUYERE



BUFFALO STEEL PRESSURE BLOWER



BUFFALO "BANNER" TIRE UPSETTER

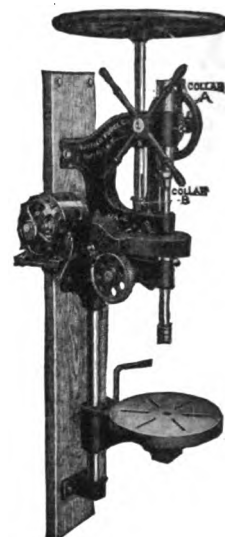


BUFFALO No. 200 SILENT BLOWER

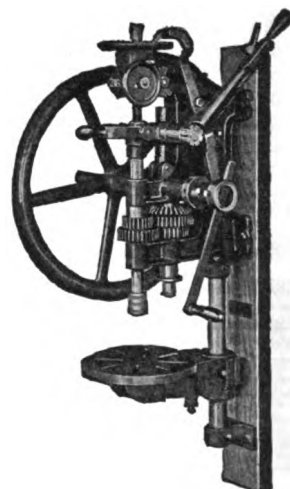
BUFFALO No. 2-E BLOWER
VARIABLE SPEED

MACHINES
FOR EVERY
SERVICE
LARGE OR
SMALL.

Write us about
your require-
ments we can
satisfy them.



BUFFALO DRILL No. 124-E



BUFFALO DRILL No. 218



BUFFALO FORGE No. 0604

Buffalo Forge Co.,

::

Buffalo, N. Y.



NW

Northwestern Horse Nails

Are the Best All Around
FOR STRENGTH, SAFETY
and QUALITY OF MATERIAL



The most perfect in form and finish. Made of the highest grade material to our own analysis. Will hold a shoe longer than any other nail made. Has a reenforced point—making it easiest to drive and the safest to use.

Union Horse Nail Co., Chicago, Ill.

THERE COMES A TIME IN THE AFFAIRS OF ANVILS



when they simply cease to be useful. Nothing marks the old, unprogressive shop as quickly as a battered and scarred anvil on a rickety base. Put in a new anvil and let your customers know you are keeping your shop up-to-date.

ARM AND HAMMER WROUGHT IRON ANVILS

have been the desire of experienced Smiths for years because they stand up under the hardest work, expect to be roughly treated, and are made of the right stuff to last long after the ordinary anvil is out of business. Make the acquaintance of an Arm and Hammer Anvil without delay—write and let us give you the details.

THE COLUMBUS ANVIL & FORGING CO.
Columbus, Ohio.

DO YOU KNOW STEEL?

Do you know how to buy, work, temper, forge and harden it? Do you know how to make furnaces, and baths for heating and tempering it?

STEEL, ITS SELECTION, ANNEALING, HARDENING AND TEMPERING.

By E. R. MARKHAM

will tell you all about steel manipulation. Mr. Markham has had over twenty-eight years of experience in steel working and he knows. His book gives you just the information you want on the subject of steel. It contains over 350 pages, and is well illustrated with many excellent engravings. The book is bound in green library cloth on heavy boards, with titles in gold, and will be sent postpaid to any address on earth for \$2.50.

AMERICAN BLACKSMITH COMPANY

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Buffalo, N. Y.

U. S. A.

KEROSENE Gas Lamps
AN IDEAL LIGHT for BLACKSMITHS and WAGON SHOPS and every purpose. Kerosene or Gasoline. Write for particulars. AGENTS WANTED. BRILLIANT GAS LAMP COMPANY
1009 F. So. Wabash Ave., CHICAGO, ILL.

Wisconsin Arms Supply Works Merrillan, Wis.

Charges are Reasonable.

Wisconsin Arms Supply Works will furnish you parts for any gun. We do expert gun repairing, Tennis racket stringing, Gun stocking a specialty.

DEATH TO HEAVES! NEWTON'S



second \$1.00 can cures heaves. The third can is guaranteed to cure or money refunded. \$1.00 per can at dealers' or sent direct prepaid. Booklet free. NEWTON REMEDY COMPANY Toledo, Ohio.

The Campbell Iron Company

Distributors of Oxy-Acetylene Welding Equipment and general Blacksmith Shop Supplies.

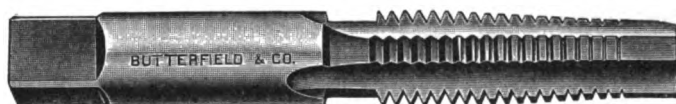
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821 CASS AVE. - ST. LOUIS, MO.



We Manufacture SHEARS AND PUNCHES

Hand or power, for shearing and punching plates, bars and angles. Send for Catalogue O. BERTSCH & CO. Cambridge City, Ind.

Butterfield's Screw Plates



We do not claim to be the oldest manufacturers of Screw Plates. We are not sure that this is any distinction.

Our claims for the superiority of our TAPS and SCREW PLATES are based on actual performance. The rapid growth of our business, is proof positive of the excellence of our product.

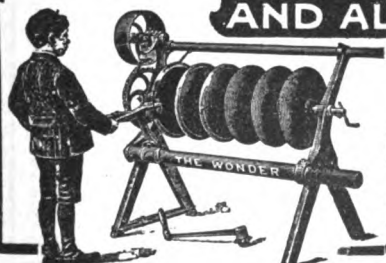
Be sure you ask for BUTTERFIELDS, and take no substitute.

NEW YORK STORE
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BUTTERFIELD & CO. DERBY LINE, VT., U.S.A.

WONDER DISC SHARPENERS

SAVE 1/2 THE TIME
AND ALL THE LABOR



THE WONDER is the only machine adjusted to all conditions.

Can shear any part of edge to any bevel.
Can shear back from edge as far as required.
Can use tool on either side of disc.
Can shift from one disc to another.

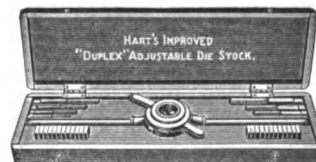
Can do all this without the turn of a set screw or nut, is a positive feed, automatically adjusts itself to wobbling or bent discs; knives made of best grade selftempered steel, will last a lifetime; for hand and power. For prices, write to your jobber or

A. E. DURNER, Manufacturer

Main Office: Evansville, Wisconsin, U. S. A.

made in Evansville, Wis., and Brandon, Man., Canada

"DUPLIX" BOLT DIE STOCK SETS



They contain dies that adjust without a wrench and require no reversing after cutting.

THE HART MFG. CO.

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Cleveland, Ohio

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Free Instructions and Book with each outfit at Factory or by Mail.

COMPLETE LINE

Tire Vulcanizers, Wrapping Machines and Many Useful Devices for Tire Shops and Factories.

64-PAGE CATALOG ON REQUEST

1894 Established 22 Years 1916

CHAS. E. MILLER
Anderson Rubber Works
Factory and Office
Anderson, Ind., U. S. A.



Give Your Shop A Chance



to show how much more it will make for you if you give it the absolutely necessary help of a Galloway Master-piece Engine. Instead of a light weight, short stroke, small bore, short lived engine you have in the Galloway a heavy long stroke, large bore engine guaranteed for five years.

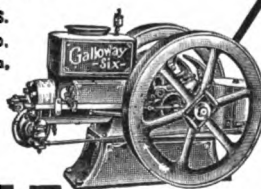
You can purchase a Galloway engine immediately no matter what the state of your ready cash. You have six easy methods to choose from. They are completely explained in my new splendid 250 page catalog. Write for your copy TODAY.

Wm. Galloway, Pres.

The Wm. Galloway Co.
925 Galloway Station,
Waterloo, Iowa.

1 3/4 H. P. \$26.75

6 H. P. - \$98.75



The Modern Treasure Box

You can obtain more real coin out of this box of Cox Welding Equipment than if you were to go treasure seeking and be as successful as Captain Kidd.

This is all the welding department a Blacksmith needs. But while its price is moderate there is no false economy in any part—each detail is up to that high standard always maintained for Cox products.

Don't you want the complete facts?

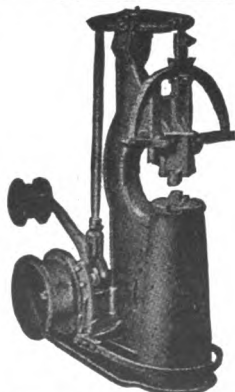
Cox Brass Mfg. Co.

Albany, Dept. 45D. New York

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BETTER THAN THREE SLEDGE HAMMERS

Little Iowa Power Hammer No. 3

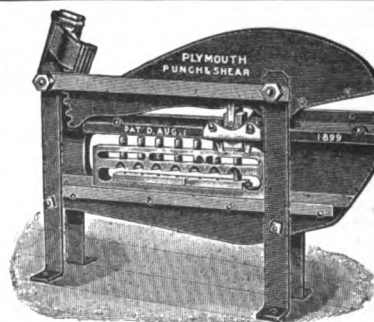
No three men can hammer out as much work as this easily operated, powerful hammer. And it has an even stroke, and accuracy impossible to attain by human efforts.

Powerful 35-pound hammer head with a total weight of 850 pounds and a compact base, 22 inches by 38 inches. Guaranteed to satisfy. If it fails, send it back at our expense. We'll refund your money. Price, \$75.00. Send for descriptive booklet.

Every United States jobber represents us. Canadian Agent: D. Ackland & Son, Ltd., Winnipeg, Can. Agent for Montevideo-Uruguay, Caso en Pando: Ambrosia Bertolotti.

MODERN SALES CO.

Hampton, Iowa - - U. S. A.



Every Blacksmith and Repair Shop

should save time, money and hard work by having a

PLYMOUTH PUNCH AND SHEAR

The only machine that will punch seven different size holes without removing the punches from the machine. Automatic sliding punch rack, no wrench required. Don't accept any other just as good.

Ask your supply house for circular and price or write to the

PLYMOUTH FOUNDRY & MACHINE CO.
PLYMOUTH, WIS.



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MEN WANTED

LEARN TO DRIVE AND REPAIR AUTOMOBILES AND TRACTORS
Big demand for trained men. Earn from \$75 to \$150 per month. Learn in 6 weeks by the

SWEENEY SYSTEM

of practical experience. You do the real work in machine shop, factory and on the road. No books used. Tools free. **FREE** Big 64 page catalogue with views of men at work in largest and best equipped auto school in world. Send name today. Address

SWEENEY AUTO SCHOOL

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15th Street,
Kansas City,
Missouri.

When you write to advertisers in reference to anything advertised here, please mention The American Blacksmith.

An Easy Way To Make Money

Don't be content to plod along on a small salary. Be independent. Go in the tire repairing business. One man says "I made \$60 the first day." Others average \$200 to \$500 a month. Very little capital needed. Jobs plentiful. Every motorist a possible customer. No experience needed. We teach you.

SHALER Tire Repair Outfit \$60

Improved Wrapped Tread Method used by Tire Manufacturers

Does as good work as the big high priced vulcanizing outfits. A boy can use it. It's the only vulcanizer that has Automatic Heat Control, and can't undercure or overcure a tire. Requires no watching or regulating.

FREE BOOK

"How to Open a Tire Repair Shop." It tells how to make big money. Don't delay. Write quick.

C. A. SHALER CO.

4800 4th St., Waupun, Wis.



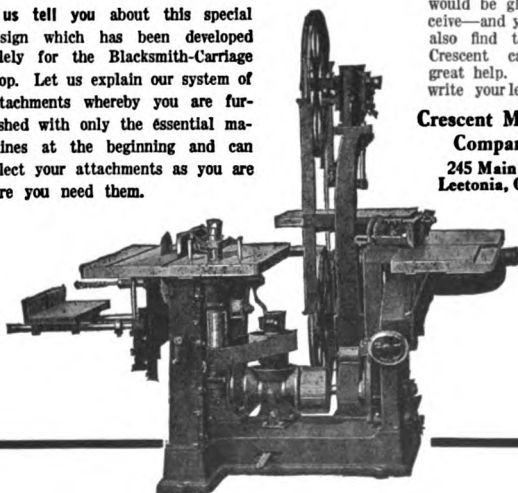
Find Out What Great Profits a Crescent Woodworker Would Make for You

Have you ever seriously considered the extra business you could handle if you had a Crescent Woodworker.

For instance this is the automobile time of the year—if you had a Crescent that would mean many chances to build new bodies or to convert old cars into motor trucks.

This is also the time when farmers are ready to buy hay racks, carts, farm wagons, plow handles, and many other articles you could make in your spare time at good profits if you had the help of a Crescent.

Let us tell you about this special design which has been developed solely for the Blacksmith-Carriage shop. Let us explain our system of attachments whereby you are furnished with only the essential machines at the beginning and can select your attachments as you are sure you need them.



This is information you would be glad to receive—and you would also find the 1916 Crescent catalog a great help. Why not write your letter now?

Crescent Machine Company,
245 Main St.,
Leetonia, Ohio.

PARK'S WAGON SHOP SPECIAL CIRCULAR RIP and CROSS-CUT SAW

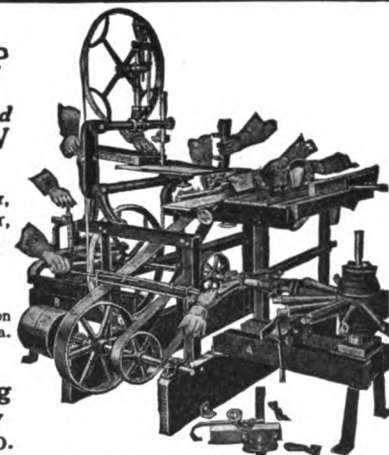
22" Bandsaw, 6" Jointer

Tilting Guide, Rim Rounder, Felloe Borer, Spoke Tenoner,
All Ready for Instant Use

No Changing

Made in two sizes. Will be sent on trial anywhere in U. S. or Canada. Write for catalog today. Don't put it off.

Park's Ball Bearing Machine Company
4100 Fergus Cincinnati, O.



Widest Opening



Horseshoers who have used them use no others.

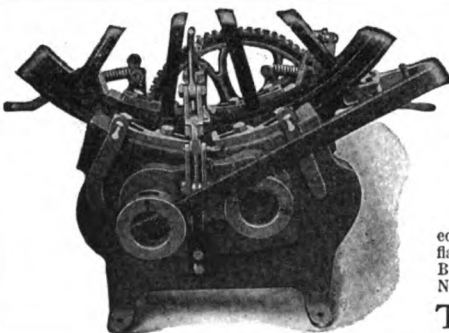
For sale by all leading Jobbers

The Wagner & Lowe Hoof Nippers are drop-forged from the best tool steel, hand tempered and hand finished throughout.



Longest Leverage

The Lowe Manufacturing Co., Enderlin, N. Dak.



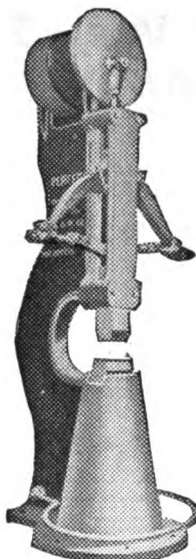
The Brooks Cold Tire Setters

Set tires cold while on the wheel. Will do a week's work in a day's time, and do it better than can be done the old way. The greatest trade builders and money makers that can be placed in a shop. Every bearing is machine finished. The heads have a circular movement which prevents straightening or flattening or kinking the tire where it is upset. Used by thousands of blacksmiths. The only cold tire setter in use and endorsed by the United States Government. We manufacture both Hydraulic and lever cold tire setters.

We are also manufacturers of the latest improved Oxy-Acetylene Welding Machines and Acetylene Generators, equipped with our famous Flash Back Safety Valve. No possible danger of an explosion or bad results from a flash back. We also build Welding Outfits to be used with cylinder compressed gas. Nothing better than the BROOKS. Our products are all fully guaranteed. Drop us a card and we will send you our booklets. DO IT NOW before you forget it.

THE BROOKS MACHINE CO., Wichita, Kansas, U. S. A.

The Perfect Power Hammer



The Simplest
in Construction

The Most
Effective in
Operation

The Most
Durable and

THE BEST

MADE IN TWO
SIZES:

3 inch square, 40 lb.
r a m — shipping
weight, 1,100 lbs.
4 inch square, 80 lb.
r a m — shipping
weight, 1,800 lbs.

Write any jobber
for Prices, or

**MACGOWAN & FINIGAN
FOUNDRY & MACHINE CO.**
204 North Third Street
ST. LOUIS, MO.

"NEW
EASY"

4 Sizes

BOLT CLIPPERS

"EASY"

2 Sizes

THE
GENUINE
TOOL



KNOWN AND
PREFERRED
EVERYWHERE

H. K. PORTER

EVERETT, MASS.

U. S. A.

EVER-READY BLANK SHARE

THE
BLACKSMITH'S
FAVORITE

Can be fitted to
more styles of
plows than can
any other pattern.



To save labor
use our Fitted
Shares for all
makes of plows.

Write for Catalog

CRESCENT FORGE & SHOVEL COMPANY

MANUFACTURERS OF HIGH GRADE
FLOWSHARES AND BLACKSMITHS' BLANKS

HAVANA, ILL., U. S. A.

"Bay State" Carriage and Tire Bolt Ratchet Wrenches

Labor
Savers!
Money
Savers!



Three Sizes
Take Hex and
Square Nuts

GEO. A. CUTTER, Sales Agent, Taunton, Mass.

Ask Your Dealer

Horse Shoe Bar Iron

MADE BY

**The Milton Mfg.
Company**
MILTON, PENN'A

Is of Superior Strength
and Quality. We can prove
it. Write us.

THE HORSE RASP OF QUALITY



Ask your dealer for the IMPROVED HELLER RASP with keen cutting hard teeth. Made in all patterns and cuts. "Slim," "Light," "Slim Light," and "Fine Cut." Insist on getting the size, kind and cut best suited for your work. It will pay you to give them a trial. New catalogue mailed free on application.

ESTABLISHED IN 1836

HELLER BROTHERS COMPANY

NEWARK, N. J.

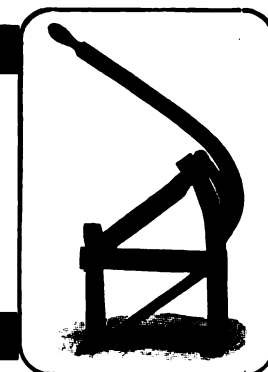
JUST WHAT YOUR SHOP NEEDS

Save 75% of the Time and Over 50% of the Hard Work
connected with your hot cutting jobs by the use of a

Simonsen Hot Trimmer

It is an actual fact that with this shear you not only save time and hard work which will add much to your profits during the season, but many of the jobs you now hate will become a pleasure to you when you find how you can do them so easily and with such added profits. Ask your jobber—or write us mentioning his name. Our circular B, showing several styles of shears, is free.

SIMONSEN IRON WORKS, SIOUX RAPIDS, IOWA, U. S. A.
Exporters: Henry W. Peabody & Co., New York, N. Y.



**CURRENT HEAVY HARDWARE PRICES.**

The following quotations are the lowest prices generally prevailing August 21, 1916. They are subject to change without notice, and higher prices are charged according to quality, specification and other conditions. Changes will be noted this month in the following columns: Anvils—Screw Calks—Plow Goods and Wheels. There has been an advance in screw calks of two dollars per thousand all along the list. Iron and steel hold their same figure.

Business continues good, with a strong demand for general vehicle repair work. The continued hot, dry weather is undoubtedly the cause.

Collections continue good and prospects are even brighter.

Horse Shoes—	
All Iron Shoes	\$5.00
Steel Shoes	5.00
No. 0 and No. 1, 25 cents extra. 15 cents per keg additional charged for packing more than one size in a keg.	
Mule Shoes	
X. L. Steel Shoes	
Countersunk Steel Shoes	
Tip Shoes	
Goodenough, heavy	
Goodenough, sharp	
Toe Weight	
Slide Weight	
E. E. Light Steel	
Steel Driving	
O. O. Mule Shoes, extra.	

Anvils\$14 & .15

Merchant Bar Iron—
\$3.30 rates, full extras, and 20 cents per 100 pounds extra for broken bundles.

Steel Bars—
\$3.30 rates, full extras.

Toe Calks—		Per Box
Blunt		\$1.65
Sharp		1.90

Screw Calks	5-16	%	7-16	1/2	%
Blizzard M....	\$20.00	\$20.00	\$22.00	\$22.00	\$24.00
Sure Grip M....	20.00	20.00	22.00	24.00	24.00
Bl. Diamond M....	20.00	20.00	22.00	24.00	24.00
Red Tip M....	22.00	22.00	24.00	24.00	26.00
Rowe, Jr., M....	20.00	20.00	22.00	22.00	24.00
Ring Point M....	22.00	22.00	24.00	24.00	26.00

Plow Goods—	Soft	Solid	Crucible
Blank Shares	\$1.18	\$1.12 1/2	\$1.13 1/2
Landside Plates	.18	.12 1/2	.13 1/2
Lister Lays—Triangle	.23	.15	.17
Lister Lays—V-Pattern	.26	.15 1/2	.17 1/2
Lister		.17 1/2	
Mould Boards	.21	.13 1/2	.14 1/2
Cult. Shov. Blanks	.20	.13	.15
(5x5—1/2x10 1/2)			

Hickory Lumber—Per Foot—	
1 to 2 1/2	\$.10
1 1/2 to 4 1/2	.12

Ash and Oak Lumber—Per Foot—	
1—1 1/2	\$.08
1 1/2—2	.08 1/2
2 1/2—3	.09
3 1/2—4	.10

Yellow Poplar Lumber Per M. Feet—	6 to 12	13 to 17	18 to 24
1/2"		\$75.00	\$85.00
3/4"		75.00	80.00
1"		78.00	85.00
1 1/4"		85.00	90.00
1 1/2"		85.00	90.00
1 3/4"		85.00	90.00
2"		85.00	90.00

Rough Hickory Axles—	
8 x 4 x 6 ft.	\$.75
8 1/2 x 4 1/2 x 6 ft.	1.00
4 x 5 x 6 ft.	1.30
5 x 6 x 6 ft.	2.40
4 x 5 x 6 1/2 ft.	1.75
4 1/2 x 5 1/2 x 7 ft.	2.30
5 x 6 x 7 ft.	2.80
5 x 7 x 7 ft.	3.40

Finished Hickory Axles	
For 2 1/2 and 2 3/4 Skeins	\$.95
For 3 Skeins	1.10
For 3 1/2 Skeins	1.85
For 3 3/4 Skeins	1.50
For 4 Skeins	1.80
For 4 1/2 Skeins	2.10

Rough Oak Bolsters—	x4	x4 1/2	x12	x14	x16
3 x 4	\$.36	\$.40	\$1.20	\$1.85	\$1.75
4 x 5	.60	.70	2.20	2.25	3.00
5 x 6	1.00	1.20			

Finished Oak Bolsters—	
2 1/2 x 3 1/2 and under	60c
3 x 4	65c
3 1/2 x 4 1/2	80c

Rough Oak Wagon Tongues—	
4 x 4, 2 x 4 1/2 and smaller	\$1.15

Finished Oak Wagon Tongues—	
3 1/2 and smaller	\$1.35
3 1/2	1.45
4	1.55

Two-Inch Sawed Hounds—	Per Pair
Tongues	35c
Front	40c
Hind	50c

Wheels—	
0 to 71 inch. A. & B. Grades	50-5%
C. Grades	45-5%
D. Grades	45%

Tiring—1 1/2 x 1/2" stocks	20%
factory	25%

Screws—1 1/4" Thread and less	37 1/2%
Rivets—1 1/2" Thread and less	37 1/2%
Boring or Boxing less than 10 cents lots	40%
Boring or Boxing 10 sets or more of one size	60%
Priming Wheels, net.	25c
Oiling, not tired, set.	20c
Allowance of 25 cents per set on all special tired wheels with three or four piece rims.	
Oiling, not tired. No. 17 to No. 39.	35c
Oiling No. 45 and larger.	40c

Special Tired Wheels—"F" Grade—3 or 4 piece Rim—	
0 1/2 x 1 1/2	\$8.60
1 1/2 x 1 1/2	8.99
8 1 1/2 x 1 1/2	9.55
8 1 1/2 x 5-16"	10.40
9 1 1/2 x 1 1/2	\$11.57
9 1 1/2 x 5-16"	12.48
13 1 1/2 x 5-16"	14.78
13 1 1/2 x 3/4"	15.75

Cupped Oak Hubs—	Plain End Oak Hubs—
10 x 14	\$8.30
11 x 14	4.20
11 x 15	4.50
11 x 16	5.10
12 x 16	5.75
12 x 17	6.80
13 x 18	6.00
7 x 8 x 9	\$1.15
7 x 9 x 10	1.25
8 x 9 x 10	1.25
8 x 10 x 11	1.50
9 x 10 x 11	1.69
9 x 11 x 12	1.80
10 x 12 x 13	2.75
11 x 13 x 14	3.90
12 x 14 x 15	4.50

Rough Sawed Felices—	
1 1/2 x 2"	\$1.70
1 1/2 x 2 1/2"	1.90
1 1/2 x 3"	2.00
3 x 3 1/2"	\$5.75
2 x 2 1/2"	\$2.10
2 1/2 x 2"	4.60
3 x 3"	5.60

Ironed Poles, White, XXX	
1/2 x 2 1/2" No. 2	\$3.80
2 x 2 1/2" No. 8	3.80

Ironed Shaft, White, XXX—	
1 1/2 x 2" and smaller	\$1.95
1 1/2 x 2"	2.20
1 1/2 x 2 1/2"	2.70

Farm Wagon Bows—	
Round Top, 1/2 x 2"	\$.80
Flat Top, 1/2 x 2"	.75
Round Top, 3/4 x 2 1/2"	1.35
Standard Size Piano Bodies with Seats—	
Each	\$4.25

Plow Beams—	
1 Horse	\$.60
2 Horse	.75
3 Horse	1.10

Spokes and Rims—	
Oak and Hickory Spokes, net on Weiss & Leach List No. 6.	
Finished Rims—XX—7/8"	\$1.75
Finished Rims—XX—1"	1.65
Oak Rims—Discounts	40-10%
Hickory Rims	40%

Wagon Neck yoke Woods—	
Keller & Tamm's List—Discount	25%

Wagon Whiffletree Woods—All Grades—	
Keller & Tamm's List—Discount	25%

Oval Plow Doubletrees—	Flat Plow Doubletrees—
2 1/2 x 36"	\$1.60
2 x 40"	2.40
1 1/2 x 3 1/2 x 42"	\$2.75

Wagon Evener Woods—	
2 x 4 and 2 x 4 1/2—Keller & Tamm's List—Discount	30%
Larger	25%

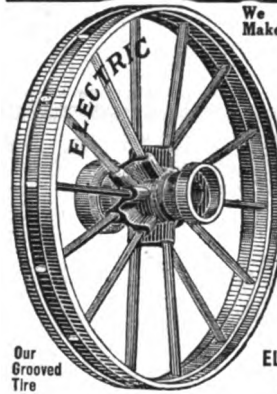
Buggy Evener Woods—All Grades	
Keller & Tamm's List—Discount	25%

Buggy Whiffletree Woods—	
Mixed Second Growth and Second Growth—Keller & Tamm's List—Discount	20%

Buggy Neck yoke Woods—All Grades	
Keller & Tamm's List—Discount	20%

HONEST DEALINGS

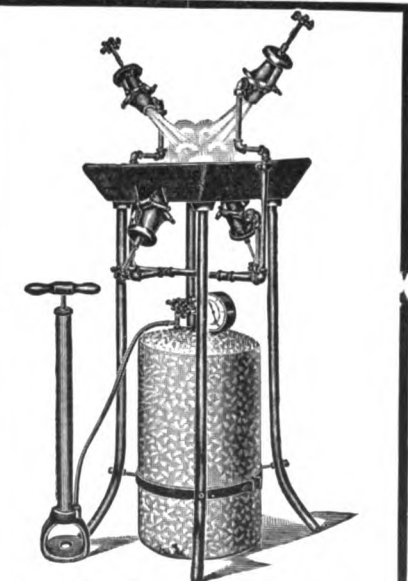
Before a display advertisement is accepted for this Journal, inquiry is made concerning the standing of the house signing it. Our readers are our friends and their interests will be protected. As a constant example of our good faith in The American Blacksmith advertisers, we will make good to subscribers loss sustained from any who prove to be deliberate swindlers. We must be notified within a month of the transaction giving rise to the complaint. This does not mean that we will concern ourselves with the settlement of petty misunderstandings between subscribers and advertisers, nor will we be responsible for losses of honorable bankrupts, nor can it include advertisements under the head of "Wanted and For Sale."



STEEL WHEELS
To Fit Any Axle
Plain or Grooved
Tire
Steel or Hickory Axles
Any Size
A Full Line of
Wood and Steel
Farm Trucks
With Steel or
Wood Wheels
Write for Large
Catalog and
Prices
ELECTRIC WHEEL CO.
Box A, Quincy, Ill.

EMPIRE STEEL WHEELS

Plain or Grooved
Tire
To Fit Any Wagon
Farm Trucks
All Standard Types
Write today for
Proposition to Blacksmiths.
Empire Mfg. Co.
P. O. Box 306
QUINCY, ILLINOIS



Best Gasoline Brazing Forge
IN THE WORLD
Thousands sold in last ten years. Four sizes. Send for catalog.
The National Rubber & Specialties Co.
4433-39 Chickering Ave., Winton Place,
Cincinnati, Ohio.

Improve Your Wagon Work

by putting on this Threlkeld Malleable Iron Standard. Specially designed for wood balsters. Greatly reduces the wear on the side of the box. Note the channel side permits using gas pipe for false standard to give continuous support. Write for circular today.

DONELSON MFG. CO., Chariton, Iowa.

"GEARS AND WAGONS"**Selle Gears**

A quarter of a century of success has placed "Selle Gears" and Wagons in the hands of the largest wagon users in the world. Express and Transfer Companies, Department Stores, Fire Departments, etc.; specify "Selle Gears" and will take no other after once tried.

230 page catalog free
THE AKRON-SELLE CO. Akron, Ohio

**Stanley
Tools****STANLEY BLACKSMITH'S BRASS RULES**

Made of spring brass—the two legs held together by a brass joint containing a stiff spring, which holds the rule rigid when open.

Particularly adapted for measuring hot metal as they can be cooled by plunging in water without the danger of rusting so common in steel rules.

Two ft. long, $\frac{3}{4}$ in. wide. Graduated in 8ths and 16ths of inches.

PRICE, \$0.50 EACH

If you cannot procure this Rule from your dealer, we will send same postage prepaid on receipt of the price mentioned above. Address,

**STANLEY RULE & LEVEL CO.
NEW BRITAIN, CONN. U.S.A.**

TRENTON ANVILS

*Solid Wrought, not cast.
Recessed Base, firmly on the block
Made in all sizes, all desirable Clips.
Ring like a Bell, Perfect in Shape.*

THE COLUMBUS FORGE & IRON CO. COLUMBUS, O.

Mr. Horseshoer:

We make such a variety of shoes to meet every need that it would take several pages to illustrate our line.

Consequently we beg that you favor us with a postal card to instruct us to send you

OUR NEW BOOKLET NO. 18

Bryden Horse Shoe Company

Catasauqua, Pa.



Sweet's Welded Toe Calks Make More Shoeing For You

ARE YOU DRIVING TRADE AWAY FROM YOUR SHOP?

A horse shod with *welded toe calks* does not stay away from your shop two or three months at a time. The horse owner *can't* fit these calks. He *has* to bring the horse to *you*. He has to come *regularly*. If you want your shop empty half the time, use shoes in which the owner *can* fit calks. If you want better business, better profits, use

Sweet's Toe Calks
"The Cold Cut Dreadnaught"

Franklin Steel Works

Joliet, Ill.
Cambridge,
Mass.
Hamilton, Ont.



Save an Hour a Day

During the busy grinding season and turn out cleaner, keener work by using

**CHICAGO QUICK CUTTING
GRINDING WHEELS**

Do more grinding every day and increase your profits by using Chicago Wheels.



Chicago Wheels are made in all grades for every purpose. Write us about your work and we will tell you just how to get best wheel for your purpose. Ask for interesting catalogue and complete information.

Don't forget to insist upon your dealer furnishing you with the grinding wheels you can have faith in—**CHICAGO WHEELS.**

CHICAGO WHEEL & MFG. CO.
108 So. Aberdeen Street, CHICAGO, ILL., U. S. A.



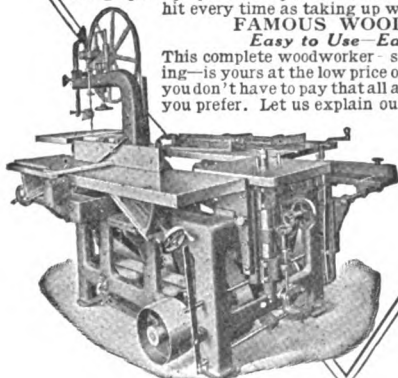
Make Your "Big Push" Now

The fort of extra profits is ready to fall into your hands if you will only bring up the proper artillery. And there is no weapon as certain to hit every time as taking up woodworking with a

FAMOUS WOODWORKER

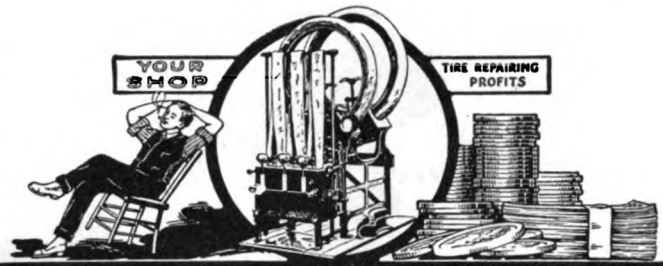
Easy to Use—Easy to Buy

This complete woodworker—sturdy and long lasting—is yours at the low price of \$125 and up. And you don't have to pay that all at one time unless you prefer. Let us explain our exceptionally liberal offer.



Write us for the details and a new free circular *at once*.

Sidney Tool Company
Sidney, Ohio, E. U. A.



TURN THAT IDLE TIME INTO MONEY

Hundreds of Blacksmith Shop owners in every part of the country have reduced their overhead costs—found the way to big profits through Tire Repairing in the spare moments that would otherwise be wasted. Car owners in your neighborhood are spending thousands of dollars every year for tire repairs. You can easily get a good share of this business if they know you have the best and most practical equipment.

Akron-Williams TIRE REPAIR OUTFITS

**Used and endorsed by more than 60 leading
Tire Manufacturers.**

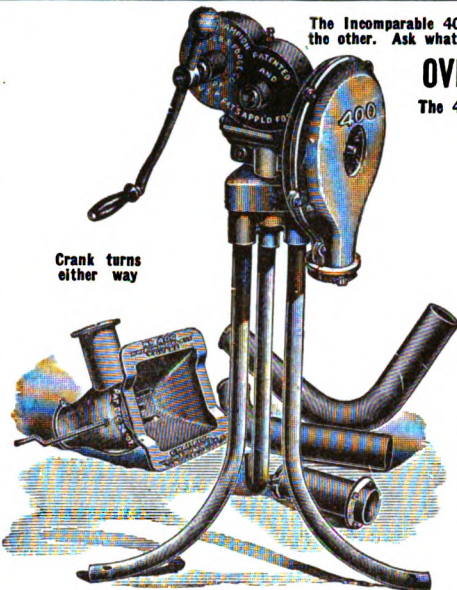
(Names furnished on request)

Akron-Williams Tire Repair Equipment is used by more than 90% of the leading Tire Manufacturers, in their factories and branches; it is recommended and sold by them to their dealers. Could there be any higher proof of its superiority over all others?

WRITE TODAY FOR NEW BOOKLET

We have just published a new booklet that is brimming full of interesting facts and figures on Tire Repairing. It gives you details of our plan for helping Akron-Williams Users get started on a paying basis from the very first day. Now is the time to get into Tire Repairing. Every day you delay means another big opportunity lost. Write us at once.

The Williams Foundry & Machine Co.
Greene Street Akron, Ohio.



Crank turns either way

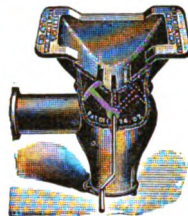
No. 400.

The incomparable 400 Blower, the one great Heirloom that will be handed down from one generation to the other. Ask what the owners say. **MADE WITH BALL BEARINGS ONLY.**

OVER 750,000 CHAMPION 400 BLOWERS IN USE.

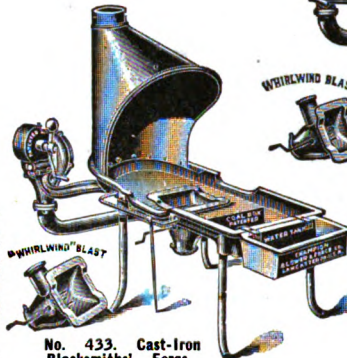
The 400 is the Blower that has Revolutionized the World in making Hand Blast.

Tuyere Iron That Makes a Whirlwind Blast



The "Whirlwind" Blast Anti-Clinker, Heavy Nest Tuyere Iron produces a circular, rotary whirlwind blast and concentrates the heat in the tuyere nest, not permitting it to blow up and out of the chimney, therefore makes a hotter fire and heats the iron one-third quicker, saving much coal.

The No. 400 "Whirlwind" Blast, Anti-Clinker, Heavy Nest Tuyere Iron is furnished with all 400 Blowers WITH-OUT EXTRA COST.

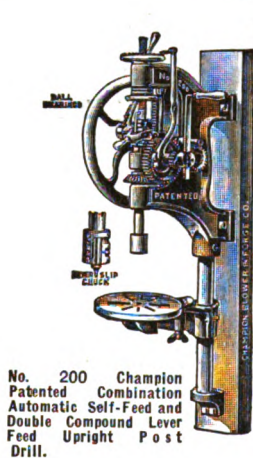


No. 433. Cast-Iron Blacksmiths' Forge

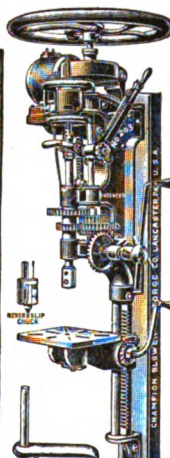


No. 408. Steel Blacksmiths' Forge.

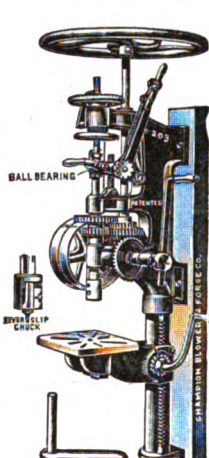
NO. 1 CHAMPION COLUMN GRINDER.



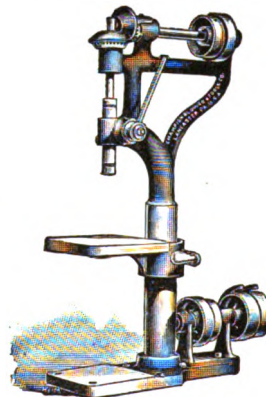
No. 200 Champion Patented Combination Automatic Self-Feed and Double Compound Lever Feed Upright Post Drill.



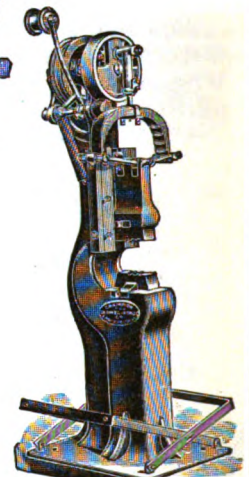
No. 203. Self-Feed and Double Compound Lever Feed, Electrically Driven Post Drill.



No. 203. Self-Feed and Double Compound Lever Feed Drill.

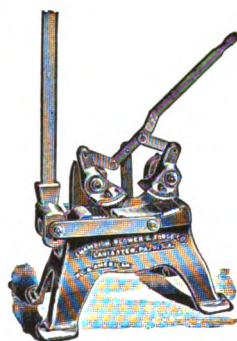


No. 0. Champion Power Bench Drill.

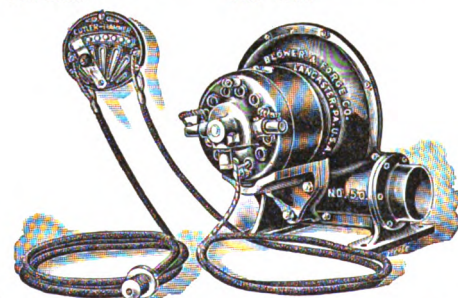


HERCULES PATENTED POWER HAMMER

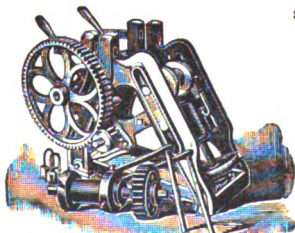
Weight of ram, 65 pounds. The Power Hammer with the flexibility in stroke of a Hammer in a Mechanic's hand.



No. 4. AMERICAN TIRE AND AXLE SHRINKER.
Will shrink up to 4x1-inch round edge tire, and axle up to 1.1-4 in.



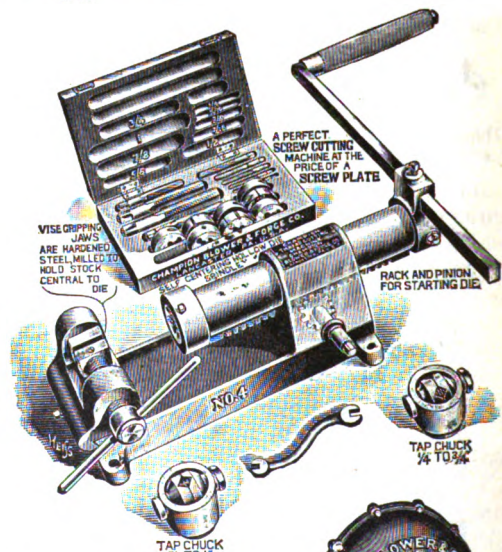
No. 50. Champion-Fire Variable Speed Electric Blacksmith Blower with a Universal Motor for Both Direct and Alternating Current, either 110 or 220 volts, with Detached Rheostat for six speeds, and Steel Pressure Blower Case, for all kinds of general Blacksmith work.



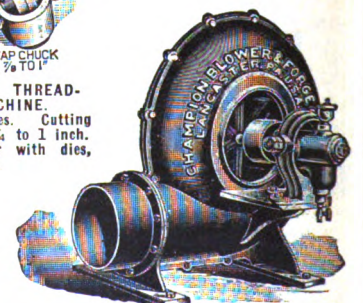
THE CHAMPION "COLUMBIAN" TIRE BENDER.
Made in three sizes.



SCREW PLATES IN FOUR STYLES, CUTTING UP TO 1 1/2 IN.
Before purchasing a Hand Blower, Forge, Drill Press, Tire Bender, Tire Shrinker, Screw Plate, Power and Electric Blower, Hammer, Punch, or Shears, write for our free catalogue, which always shows the greatest variety of Improved Blacksmith tools built under one control in the world.



THE CHAMPION THREAD-CUTTING MACHINE.
Made in four styles. Cutting from 1/4 to 3/4, or 1/2 to 1 inch. With dies only, or with dies, taps and tap chuck.



FAN BLOWERS MADE IN SIZES TO 64 INCHES IN HEIGHT

THE CHAMPION BLOWER AND FORGE CO., Lancaster, Pa., U. S. A.



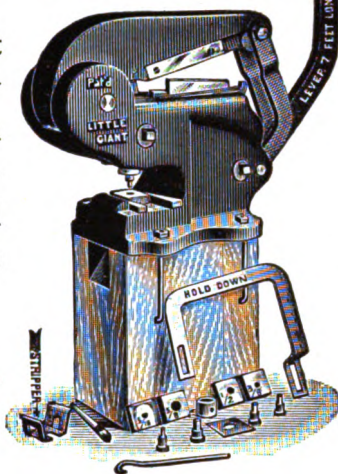
Get the New

Little Giant

TRADE MARK REG.
CATALOGUE.

We have just issued a New Catalogue which completely describes our full line of Punches and Shears.

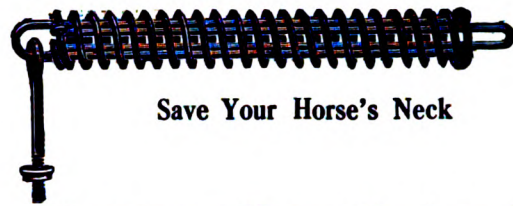
Write for it AT ONCE.



It will pay you to look it over before buying.

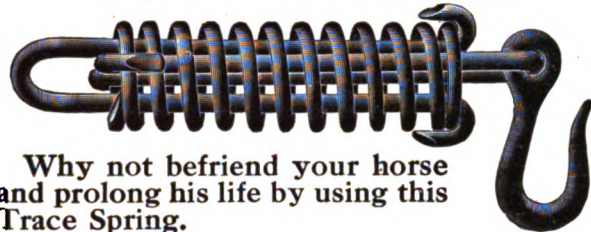
Little Giant Punch & Shear Co.
210 S. Market St. SPARTA, ILL.

RAYMOND POLE SPRINGS



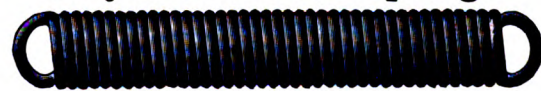
Save Your Horse's Neck

Keystone Trace Spring



Why not befriend your horse and prolong his life by using this Trace Spring.

Keystone Brake Springs



Write your Jobber for Circular and Prices

RAYMOND MANUFACTURING CO.
LIMITED
Corry - - - PA.

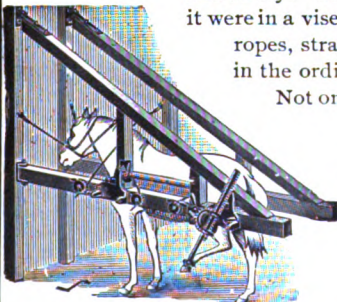
ONCE IS ENOUGH

to break your bones, lay you up in bed for weeks, and pile up bills enough to keep you broke for months. Compared with such a costly experience you are indeed practicing true economy when you use



Barcus Safety Horse Stocks

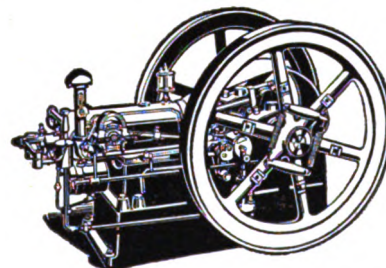
The great feature of Barcus stocks is the Safety Foot Clamp. Automatic in action it works positively, quickly and safely. The foot is held as secure as if it were in a vise. And there are none of those ropes, straps or buckles so bothersome in the ordinary stock.



Not only do you protect yourself but you play square with your men and show a humane regard for the animals placed in your care, when you have Barcus stocks. The cost? Much less than you think—write and find out.

The Barcus Mfg. Co., Wabash, Indiana.

Over a Quarter Million Titans Have Been Sold



Titan engines have two basic, all-important reasons for being on the market. The first is the insistent demand for an always better engine at an always reasonable price: the second is the demand for an engine that will operate on cheap, low grade kerosene fuel.

When an engine will burn gasoline only, the owner is restricted to the one fuel. Gasoline is expensive and sometimes hard to get. On the other hand the price of kerosene and other cheap fuels is constantly going down, the supply is plentiful, and if one kind is difficult to get there are a number of other kinds—benzine, naphtha, motor spirits, fuel oil—some or all of which easily can be obtained.

Titan engines are made in all sizes and styles, from 1 to 50 H. P. You can't buy a better engine, or one that will cost you less money per year of service. Write us for full information about the **Titan** line of kerosene engines. We will send it promptly.

International Harvester Company of America
(INCORPORATED)

13 Harvester Building

Chicago U S A

**LET BANNER BOY STOP AT YOUR SHOP!**

You are in for a big surprise. When you let Banner Boy bring you a liberal FREE sample of Banner Welding Compound your welding troubles will end, guess work will have changed to certainty, and there will be a good profit in every welding job.

With Banner you can weld at lower temperatures. There are no hard scales or falling compound while heating. And each weld is perfectly even and smooth.

But don't take our word for this—prove it yourself.

Write us your address and that of your jobber—the Big Free Sample will come by return mail. Nearly all jobbers have Banner. Get it now.

THE CORTLAND SPECIALTY CO., CORTLAND, N. Y.

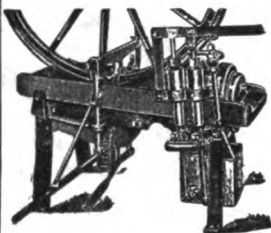
**HERE'S THE HANDY HELPER
EVERY SMITH NEEDS DAILY**

Time, trouble and exasperation can be saved every time you sharpen heel and toe calks, pull off old toes, knock out sickle sections, upset thin iron, bend angles or such other work as hot rasping, steel plugging, turning ordinary mud calks or traveling tires by using this

Improved Fuller Foot Vise

No matter how thick the stock this vise, unlike the ordinary foot vise, locks instantly with a light, even pressure. Its great grip is equalled only by a heavy screw vise. Write for complete details or ask your jobber.

**C. & E. MANUFACTURING COMPANY
MARSHALLTOWN, IOWA**

**House Hydraulic Cold Tire Setter**

**G
U
A
R
A
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E
E
D
T
O**

Bring new customers.
Save time and labor.
Save wheels and material.
Work easier and faster.
Do better work.
Last longer.
Make more money, and give better satisfaction than any Cold Tire Setter on the market.
Get one now from your Jobber or write us.

**House Cold Tire Setter Company
4143 Laclede Ave., St. Louis, Mo.**

**TURN THAT STREAM OF PROFITS
INTO YOUR SHOP**

Why longer let the good money in oxy-acetylene welding pass on to another shop? It is ready to stop at your door if you do the work. And all you need do to capture these good extra profits and make a welding reputation for your shop is to put in this

IDEAL WELDER

Then you are ready to tackle the largest or smallest welding jobs with complete success. And you do not have to make a large investment—the IDEAL outfit is low priced enough to pay for itself in an unusually short time.

You will be well repaid if you write immediately for complete information regarding the IDEAL outfit.

GENERAL WELDING CO.

394 14th Street, Hoboken, N. J.



If you have never learned by actual experience just how good **Pioneer Shaft Ends** are, do it now by ordering a few of your jobber, and don't let him pawn off on you the "just-as-good," "may suit" brand. Look for the Pioneer trade-mark on the wrappers. Possibly you order a certain kind of horse nails and shoes because they are better and please. So why not specify **Pioneer Shaft Ends** for the same reason? Once you get acquainted, they will be your affinity ever afterwards.

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